Clinton Laurence

Attributional, affective and perceptual processes during injury and rehabilitation in active people.

A report of an investigation submitted as a partial requirement for the Master of Clinical Psychology degree at the Australian National University

August, 1996

Statement of Originality

I declare that this report, *Attributional, affective and perceptual processes during injury and rehabilitation in active people*, is an original piece of work and that all sources of information have been acknowledged.

Signed: C. Laurence.

(Clinton Laurence)

Date: 21/8/96

Acknowledgements

Firstly, I would like to thank the staff at the Duntroon Physiotherapy Centre for their cooperation and patience in administering questionnaires and helping to collect data. This study would not have been possible without the invaluable support of Elizabeth Angwin, Diana Bonner, Waratah Eddleston, Faye Schulz, Frances Sutherland and Julia Witteveen. Secondly, the approval to conduct the study from the Commandant's Office of both the Australian Defence Force Academy and the Royal Military College Duntroon and the Commanding Officer of the Duntroon Medical Centre gave the green light for the study to progress from simply an idea to a realistic possibility. Finally, I'm grateful to my supervisor, Dr. Don Byrne, for his support throughout the thesis and his helpful critique of the final draft.

Abstract

The present study utilised a longitudinal design to assess attributional, affective and perceptual processes in 76 active subjects with minor to moderate ankle injuries. Measures were collected at three points in time: soon after the injury, about midway through rehabilitation and at the end of rehabilitation. Recovery outcomes were evaluated utilising both behavioural and self-report measures. Subjects were most likely to attribute the causes of their injury to mechanical/technical factors (41%) with little emphasis placed on psychological factors (7%). In contrast, subjects attributed the causes of rehabilitation to physiotherapy (39%), rest (22%) and exercise (19%). In the main, none of the attributional dimensions or affective measures throughout rehabilitation significantly differentiated between subjects with different severity of injuries or speed of recoveries. Both negative affect and pain intensity significantly decreased as rehabilitation progressed to the final treatment but positive affect remain unchanged. Subjects perceived themselves to be around 40% recovered at the start of treatment and terminated treatment at about 80% recovered, irrespective of their actual recovery time. Subjects who recovered faster actually expected to recover faster before rehabilitation had commenced. Subjects with moderately severe injuries significantly underestimated their actual recovery time by almost 50%. Subjects who recovered faster had expectations for recovery that matched their actual recovery times but slow healers underestimated their actual recovery by an average of 65%. There appeared to be few relationships between attributional measures, affective measures and recovery outcomes. Implications of these results for future research and the enhancement of recovery are discussed.

Table of Contents

Introduction

The role of psychology in the prevention and treatment of injuries, especially sporting injuries, has received increasing attention in recent years. There are two main reasons for this focus. The first is because of the magnitude of the problem. For example, a report commissioned by the National Better Health Program (1990) in Australia summarised the following statistics:

(1) Injuries are the third major cause of death after heart disease and cancer and the single most costly in terms of morbidity (around $20 billion).

(2) There are around one million sports injuries annually.

(3) About 200000 of these are regarded as serious and 40000 require hospitalisation.

(4) Direct and indirect costs of sports injuries were estimated in 1990 value terms of around $1 billion.

Therefore injuries, especially sporting injuries, constitute a significant threat to physical well being and general health.

The second reason for the research focus on sporting injuries is that they occur with a fairly high frequency and severity in a relatively closed environment so their causes and relationships with other variables can be easily assessed. The findings from this research may have implications for other areas in health psychology, behavioural medicine and psycho-immunology.

Nideffer (1989, p. 241) has asked three questions on the psychological aspects of sports injuries: "To what extent can those injuries be attributed to psychological factors? To what extent do, or should, psychological factors play a role in the treatment of and recovery from sports related injuries? What is the role of the sport psychologist, in the prevention and treatment of injuries?"

Traditionally, the bulk of the research has focused on the first question or the psychological determinants of sporting injuries. It is only relatively recently that research has started to examine the role of psychological factors in the rehabilitation of injuries. It is the latter question that is the primary focus of this paper.

Three main theoretical formulations have been identified in the sport psychology literature to help describe and explain the psychological processes and responses during rehabilitation of sporting injuries: the grief model, the stress model of injury and the interactional model of stress and athletic injury. Each of these previous injury models will briefly be described.

Previous Injury Models

The Grief Model

The first is the grief model based on the work of Kubler-Ross (1969). Supposedly, the typical athlete's responses to injury are similar to the stages of adapting to death and dying. Gordon (1988, p. 5) has stated that "the five stages - denial, anger, bargaining, depression and acceptance - are distinguishable by distinct attitudes, private feelings

and/or reactions such as those illustrated in Table 1." This Table has been replicated here.

Table 1 Typical Reactions to Serious Injury in Soccer

Hypothesised Response Stages	Typical Inner-Dialogue
Denial	"I'll be OK! - I'll run it off." "It's not as bad as it seems."
Bargaining	"OK, I'm hurt. I'll see the doctor and specialist, go for treatment - but only when it suits me! - and I'll get back in time for the (cup) playoffs."
Depression	"I'm so sore - it's hopeless." "I can't do anything anymore - I can't even bear watching a game - I'm really out of it."
Acceptance/ Resignation	"OK, what's happened has happened - no point in worrying anymore about that, is there? Regret really is a waste of time." "I must now try and help the team and do as much as I can to help myself."

To date only one study has been published that provides some empirical support for the application of this model to athletic injury. McDonald and Hardy (1990) using the Profile of Mood States (POMS) questionnaire tested five athletes with serious injury eight times throughout the first four weeks immediately following injury. As

expected, reactions to injury progressed from a negative to a positive mood state as rehabilitation progressed. More importantly, emotional reactions to injury seemed to describe the two-stage process of Schontz (1975) rather than the four-stage grief model of Kubler-Ross (1969) . The first is the impact stage which is very intense and relatively brief and includes feelings of panic, disorganisation and helplessness. The second stage includes retreatment and acknowledgment where the athlete uses a kind of denial to either retreat into illness or into health.

This two stage pattern may be more realistic than extrapolating from the grief model based on death and dying where obviously the perceptions and consequences of this situation will induce more extreme and varied emotional reactions. Because of these possible differences between the emotional reactions to death and dying and those to sporting injuries it is necessary to examine under what conditions of sporting injury will the emotional reactions be most pronounced. As a result Gordon, Milios and Grove (1991) have attempted to identify the factors affecting the degree of response to injury in their investigation of the recovery process from the perspective of physiotherapists. Physiotherapists' responses to a questionnaire indicated that they believed the timing of the injury to be the most critical factor affecting an athlete's reactions. This was followed by intensity of sport involvement, level of competition, the personality of the athlete, athletes' faith in therapists and confidence in the therapists' diagnosis. Interestingly, these factors were rated as having more effect on the response to injury than the severity of injury itself.

A major limitation of this study was that the physiotherapists' ratings were only descriptively analysed and there was only 0.63 of a point on a seven point likert scale separating the most critical factor of timing of injury from the factor of severity of injury. No inferential statistics were performed. Finally, the perceptions of the injury from the perspective of physiotherapists may well differ from the athletes' perceptions of injury. For example, athletes may well underestimate the severity of an injury compared to physiotherapists (Crossman, Jamieson and Hume, 1990). Therefore, it seems important to examine the athlete's perceptions of these factors and how they may mediate the degree of psychological response to injury and hence affect recovery rates.

The Stress Model of Injury

The second theoretical formulation to explain the psychological processes and responses during rehabilitation of sporting injuries considers injury as a stressor (Weiss & Troxel, 1986; Wiese & Weiss, 1987). Injury is regarded as an unpleasant stressor that places an excessive demand on an athlete's responses to adapt to injury to the extent that it is actually distressful. This four stage response to athletic injury as a stress response is reproduced in Figure 1.

This provides an alternative theoretical framework to the grief model for understanding the injury process. It seems that previous studies have focused on one of the stages in Figure 1. For example, the McDonald & Hardy (1990) study examining affective response patterns using the POMS primarily investigated the third stage of emotional response. If injury is viewed as a stressor, then the emotional

response could also be measured by detecting changes in physiological arousal (Weiss & Troxel, 1986) and/or the narrowing of attention on the pain associated with the injury or to the fear of the consequences of the injury (Nideffer, 1981). To date, no studies have investigated physiological or attentional changes during the rehabilitation of injuries.

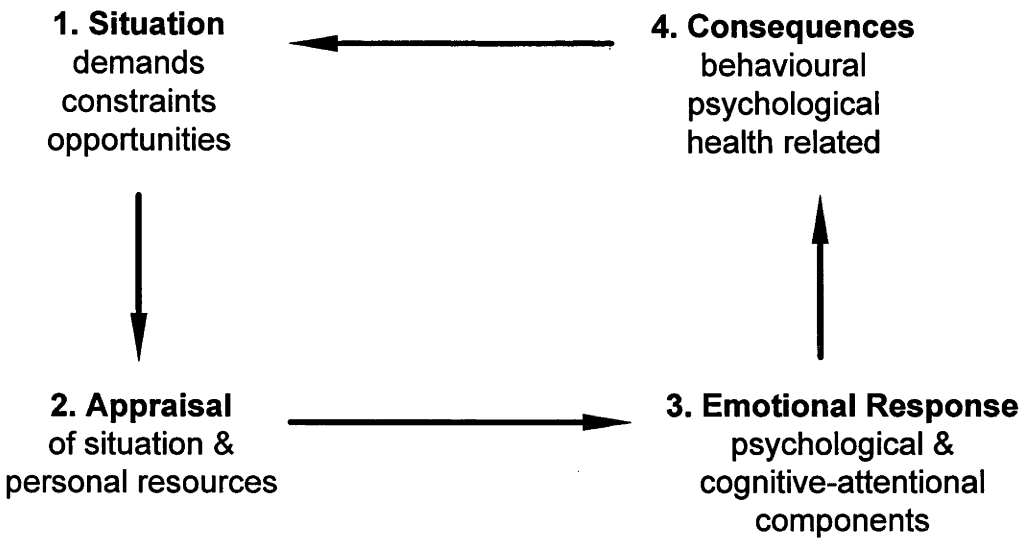


Figure 1. The stress response

The crucial step that determines emotional responses to injury, as outlined in Figure 1, is the cognitive appraisal of the injury stressor and the ability to cope with this demand. According to this model, "cognitions or thoughts can either cause or mediate a condition of actual, measurable damage in the body" (Weiss & Troxel, 1986, p. 105). Some of the factors that an athlete may include as part of the cognitive appraisal have already been alluded to in the Gordon et al. (1991) study of physiotherapists' perceptions (such as timing of the injury). A negative self-talk pattern may also emerge during this appraisal. For example (Weiss & Troxel, 1986, p. 105): "What if I

don't come back this season?" "What will the coach think of me?" "What if my teammates think I'm letting them down?" Further examples are reported in Table 1.

Ievleva & Orlick (1991) provide some evidence for the role of positive self-talk in athletic rehabilitation. They developed the Sports Injury Survey to measure the factors of positive attitude, outlook, stress control, social support, goal setting, positive self-talk and mental imagery. A total of 39 athletes who had recovered from serious injury were mailed this survey to determine the contribution of these factors to their recovery time. Goal setting, positive self-talk and imagery were the three top variables associated with the fastest recovery times. Unfortunately, this study utilised a retrospective design and therefore provided no indication of how cognitions might change over time as rehabilitation progressed. As Figure 1 shows, the stress response model is recursive, that is, as rehabilitation successfully progresses, the stress response is moderated and hence the later stages of cognitive appraisal, emotional responses and consequences are also modified. Unlike studies investigating emotional responses using the POMS, there have been no studies examining changes in cognitions and appraisals during rehabilitation.

The Interactional Model of Stress and Athletic Injury

The interactional model of stress and athletic injury proposed by Anderson & Williams (1988) not only incorporates the previous model of Weiss and Troxel (1986) but has the additional benefits of specifying the moderating effects of personality, history of stressors and coping resources on the stress response and suggesting possible interventions (see Figure 2). The model was originally proposed to provide a

framework for the prediction and prevention of injuries but it can also be generalised to the rehabilitation of injuries.

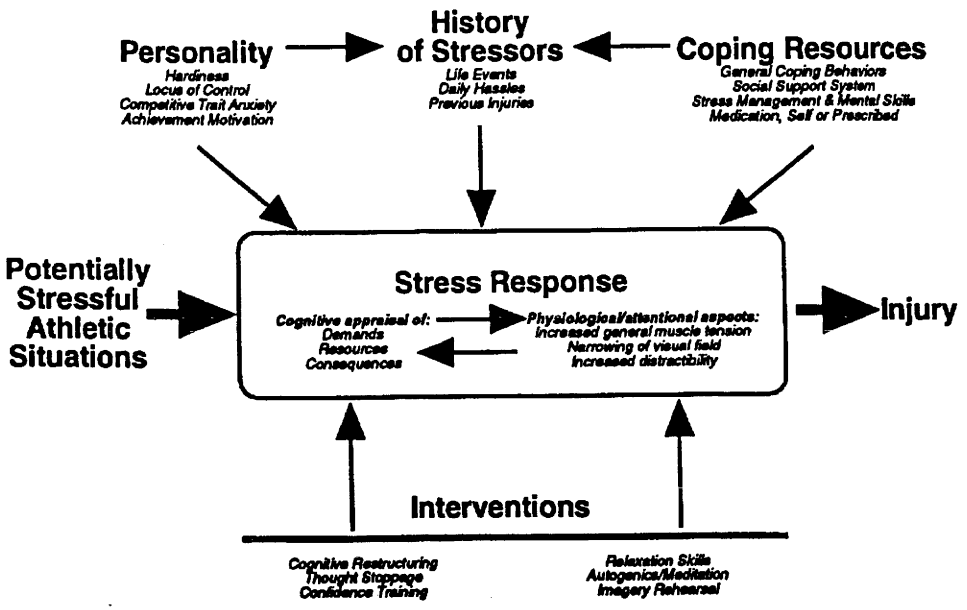


Figure 2. The Interactional Model of Stress and Athletic Injury by Andersen & Williams (1988).

Andersen & Williams (1988) state that their model is not unique but is derived from Smith's (1980) mediational model of stress and is similar to other models found in the health (e.g., Allen, 1983; Pelletier, 1977) and sport psychology (e.g., Martens, 1975) literature. Essentially (Andersen & Williams, 1988, p. 298):

> The model is predicted on the assumption that the two basic mechanisms behind the stress-injury relationship are increases in general muscle tension and deficits in attention during stress. It is hypothesised that individuals with a lot of stress in their lives who have personality traits that tend to exacerbate the stress response and few coping resources will, in a stressful situation, be more likely to appraise the situation as stressful, exhibit greater muscle tension and attentional changes and thus be at greater risk compared to individuals who have the opposite profile.

Similarly, in rehabilitation of injuries, individuals with greater muscle tension and attentional changes will brace the injured body part and focus on the pain and consequences of the injury, thereby contributing to slower recovery rates (Nideffer, 1981).

The central component of both the interactional model of stress and athletic injury proposed by Anderson & Williams (1988) and the previous model of Weiss and Troxel (1986) is the role of cognitive appraisals in determining the emotional reactions to injury. The main proposition of this paper is that to understand and possibly predict the recovery rate of an individual it is important to know how the individual perceives and reacts to the injury stress.

Causal Ascriptions for Injury and Rehabilitation

One of the possible first steps in examining how an individual appraises the injury stress is identifying what the individual perceives as the causes of success or failure in this situation. This has been the province of attribution research which has largely examined success and failure outcomes in academic (e.g., Weiner, Russell, & Lerman, 1979) and sport achievement settings (e.g., McAuley & Gross, 1983; McAuley, Russell, & Gross, 1983). Typically, the attributional question asked subjects why they succeeded or failed in an academic situation or won or loss in a sport situation. The primary causal ascriptions in these situations were to ability, effort, task difficulty and luck. Perhaps other "why" questions could be asked. In the case of injuries, two questions are of primary importance. The first is "Why did I get injured?", while

during rehabilitation people ask themselves, "Why is it taking so long for me to get better?" or alternatively, "Why am I getting better?". At the end of rehabilitation "Why did I recover so quickly?" is a question asked to evaluate the effectiveness of treatment. Other questions, though less important, might be: "Why is my injury hurting so much?", "Why did I get injured now?" and "Why do I need to see a physiotherapist?"

Why are the answers to these kinds of questions important? Weiner (1986, p. 2) has suggested, "once a cause or causes are assigned, in many instances a prescription or guide for future action can be suggested" and "there is a strong possibility that there will be an attempt to alter the causes to produce a different (more positive) effect" in the case of failure. Therefore, when an individual is injured, a causal search is initiated to find the cause of this injury. For example, if an athlete believes an injury is the result of a lack of training, then this cause may have implications for the future behaviour of the athlete, that is, the athlete may train harder or do a different kind of training to avoid the injury in future. Similarly, if the athlete believes the cause of rehabilitation from an injury is lots of rest, then this athlete's recovery may be different from one who perceives the cause of rehabilitation is appropriate exercise. Therefore, it is predicted that an individual's recovery from injury is very much dependent upon the kinds of causal ascriptions they make.

Of course, as discussed earlier, the difficult aspect of measuring causal ascriptions to injury and rehabilitation is asking the right questions. The models described in Figures 1 and 2 are essentially process models and therefore cognitive appraisals and affects

will vary across time. The kind and importance of the attribution questions asked depends on when in the injury-rehabilitation cycle they are asked. It would seem as a minimum requirement that causal ascriptions need to be measured soon after injury, about half-way through recovery and at the end of rehabilitation and therefore it is important, to ask subjects attributional questions relevant to these three points in time (see "The Role of Affect Processes During Rehabilitation").

The only study to specifically examine causal ascriptions in the injury or recovery field was by Grove, Hanrahan, & Stewart (1990) who asked physical education students to imagine recovering very slowly or quickly from a serious sports injury and then to answer questions concerning the cause of the injury. Their results indicated that psychological factors accounted for rapid and slow recovery in 25% and 24% of the cases respectively. Physiological and behavioural factors were the next most frequent ascriptions at about 15%. These results indicated that psychological factors may play the most important role in recovery from injury.

Unfortunately, their study was based on ascriptions to an imagined injury. It is preferable to utilise a research design to assess attributions to an actual injury rather than to an imagined injury that some subjects may never have experienced. Grove et al. (1990) acknowledged this limitation in their study when they asked subjects to vividly imagine recovering very slowly or very quickly from a serious sports injury. Even an image-based reconstruction of an actual injury is more satisfactory than an image-based reconstruction of an unreal scenario. The purpose of the present study

was to not only replicate the Grove et al. (1990) study but to extend it and examine the causal ascriptions for an actual injury incidence and recovery from this injury.

The Role of Attributional Dimensions During Rehabilitation

The Grove et al. (1990) study examined more than causal ascriptions for recovery. The study also examined the underlying structure or dimensions of these ascriptions and the possible relationship to personality variables (achievement motivation, trait anxiety and physical self-esteem). The dimensions of the ascriptions were assessed by asking subjects to rate each ascription on five separate seven-point bipolar scales. The five scales assessed the degree to which the subject perceived the cause to be internal or external to them, stable or unstable over time, controllable or uncontrollable, specific to this situation or more global in nature and intentional or unintentional. Generally, the findings showed that irrespective of the students' personality grouping, students perceived the causes of slow recovery as more internal (i.e., totally due to themselves), less stable (not always present), less global (i.e., influences just this event), less controllable and less intentional than the causes of fast recovery. Grove et al. (1990, p. 112) argue that such attributions for poor recovery are functional in that it "implies problems in rehabilitation can be overcome and that good progress is likely to continue".

However, learned helplessness theory would predict that individuals who perceive events to be uncontrollable would more likely attribute negative outcomes to causes that are more internal, stable and global while attribute causes for positive outcomes

that are external, unstable and specific. Such an attributional pattern is referred to as a pessimistic explanatory style. Individuals possessing a pessimistic explanatory style are more likely to become depressed (Abramson, Seligman, & Teasdale, 1978). In fact, both learned helplessness theory and Beck's (1976) cognitive theory of depression place a great emphasis on the role of expectations, beliefs, attributions and internal dialogues in causing depression, essentially an emotional response to a stressful event. There are extensive parallels between these theories on depression and those on the injury process. As a result, the attribution findings in the depression area have relevance for understanding the role of attributions in the injury area.

In the depression literature, attributions are typically measured by the Attributional Style Questionnaire (ASQ) developed by Seligman, Abramson, Semmel and Baeyer (1979). It consists of 12 hypothetical situations with half the situations describing good outcomes and the other half describing bad outcomes. Subjects have to write down a major cause of each situation and then rate each cause on a 7-point likert scale for internality, stability and globality. The ASQ is very similar to the method used for assessing attributions in the Grove et al. (1990) study. Therefore, of interest is some unpublished data by Peterson (1990) using the ASQ indicating that a pessimistic explanatory style (ie., attributing failure to internal, global and stable factors) is correlated with self-report ratings of (1) lack of control over one's athletic career and negative reactions to athletic setbacks, (2) less ability to overcome injuries and (3) less likelihood to perform well following disappointing losses. However, the results of the Grove et al. (1990) study do not appear to be totally consistent with this study and attribution theory generally and therefore needs replication. It is hypothesised that

individuals with a more pessimistic attributional style will recover slower from serious injury and not only be more depressed but experience greater negative affect generally.

Strickland (1989, p. 5) has cited several studies examining health outcomes supporting such an hypothesis:

> A pessimistic explanatory style in early adulthood appears to be a risk factor for poor health in middle and late adulthood (Peterson, Seligman & Valliant, 1988) and is related to lowered immune function (Kamen, Rodin, Seligman, 1987) and illness (Peterson, 1988).... Optimistic individuals report fewer physical symptoms and a greater sense of physical well-being than persons who are less optimistic (Reker & Wong, 1985; Scheier & Carver, 1985), and they have a better recovery from coronary artery bypass surgery (Scheier et al., 1986).

The emphasis in these studies has been derived from learned helplessness theory and it's conceptualisations of pessimistic and optimistic explanatory styles.

In contrast, Weiner's (1985) attributional theory of achievement motivation and emotion provides not only an alternative but an integrative theory of motivated behaviour in achievement settings including health settings. Following an event, particularly a negative event, people initiate a causal search to determine why this event occurred. Answering why this event occurred helps people manage their lives more effectively and plan for future contingencies. For negative events, people will attempt to alter the causes to produce a more desirable future event. Weiner (1985) proposes that all causes or attributions have an underlying causal structure. This causal structure consists of the dimensions of locus of causality, stability and

controllability. Two other dimensions might also exist, intentionality and globality, though Weiner believes empirical support for these dimensions is lacking. Therefore, Weiner's (1985) attributional theory differs from Abramson's et al. (1978) conception on the controllability and globality dimensions. There are two additional differences. Firstly, Weiner (1985) has attempted to relate attributional dimensions to specific affects. This will be discussed in the next section. Secondly, attributional dimensions are measured differently. This will now be briefly discussed.

Essentially, the measurement of attributional dimensions has focused on "individual's general or cross-situational perceptions of causality" (Russell, 1982, p. 1144) or perceptions of causality in specific situations. Weiner (1986, p. 221) has argued that the ASQ attempts to measure an attributional trait but "there is little evidence that attributions have cross-situational generality". An examination of some studies using variations of the ASQ support his argument. For example, Peterson (1990) has argued that the original ASQ was developed for administration to college students and therefore its items may be less valid for other populations. In his own research, he developed sport specific Attributional Style Questionnaires. Along these lines, Hanrahan, Grove & Hattie (1989) reported on the development of the Sport Attributional Style Scale (SASS). It measures attributional style along seven-point bipolar scales for the five dimensions of internality, stability, globality, controllability and intentionality for both positive and negative events. Most studies in the literature use the Attributional Style Questionnaire (ASQ) but the SASS has been found to have higher correlations for situations involving actual sporting experiences (Hanrahan & Grove, 1990). Studies (Hanrahan, Grove, & Hattie 1989; Hanrahan & Grove, 1990)

have confirmed its test-retest reliabilities, construct validity and that it measures similar areas as the more general ASQ but without unnecessary duplication.

Taking this logic of attributional specificity one step further, it may be better to assess the attributions to a particular event rather than determining a general attributional style, especially when the emotional and behavioural reactions to that event are important, as in the injury rehabilitation relationship. This is the approach advocated by Weiner (1986). With this purpose in mind, Russell (1982) has developed the Causal Dimension Scale to examine the specific attributions people make for events by allowing people to make their own open ended attribution for an event and to code that attribution along the causal dimensions of locus of causality, stability and controllability on a nine-point scale. More recently, the revised Causal Dimension Scale (CDSII; McAuley, Duncan, & Russell, in press) consists of four causal dimensions by classifying the controllability dimension into two further dimensions of personal control and external control and therefore helping to distinguish between causes that are controlled by the individual or by other people. This instrument is used in the present study to measure attributional dimensions.

In summary, the argument developed in this section is that the underlying structure or attributional dimensions of causal ascriptions needs to be investigated to specific situations using the CDSII. It is hypothesised that individuals who recover slowly will more likely perceive the cause of their injury and rehabilitation as having a more internal locus of causality, stable across time and with little personal control. Predictions with the external control dimension are less clear since it has not been

utilised in studies of the present nature. It may be expected that subjects who recover slowly may also have low external control since they may be less likely to seek help from medical personal such as physiotherapists.

The Role of Affect Processes During Rehabilitation

Amirkhan (1990) states that only a few studies have utilised an attributional approach in studying stress (e.g., Baumgardner, Heppner & Arkin, 1986; Follette & Jacobson, 1987; Taylor, Lichtman, & Wood, 1984). Such an approach is useful because (Amirkhan, 1990): (1) attribution theory evolved in the context of negative life events, (2) a causal search is most likely after negative, unexpected and sudden changes in events and these are usually the most stressful, (3) one of the dimensions, controllability, has also been independently identified by stress researchers and (4) attribution theory links the perception of an event to the resulting affective and behavioural reactions. This latter point is one of the advantages of adopting Weiner's (1985) attribution theory of motivation because it predicts the role of emotions in this process. The arguments developed in the section on "Previous Injury Models" highlighted the importance of both cognitive appraisals and emotions in understanding the injury rehabilitation relationship. Weiner's theory nicely ties these two constructs together.

Weiner (1985) proposes that following the outcome of an event there is an initial general positive or negative reaction, essentially happy for success and frustrated or sad for failure. This becomes more finely differentiated after the causal search. Weiner

proposes that each causal dimension is related to a particular affect. Table 2 summarises this relationship. For example, the theory predicts that for negative events such as injuries, a person who ascribes the cause to internal reasons (e.g., lack of training) should experience low self-esteem. Finally, a person who has low expectations for future success, perhaps recovering very slowly from injury, has low self-esteem, is feeling sad, ashamed and hopeless and therefore will then put less effort into further rehabilitation.

Table 2 The Relationship Between Attributional Dimensions and Affects

Attributional Dimension	**Corresponding Affects**
Locus of causality	self-esteem, pride, surprise, calmness, serenity, competence, happiness
Stability	hopelessness and hopefulness
Controllability	shame, guilt, anger, pity, gratitude

Previous attributional studies have generally failed to apply Weiner's (1985) extended model, especially the measurement of affect from causal dimensions, to health settings (Amirkhan, 1990; McAuley, 1991). The study of McAuley (1991) is perhaps the only comprehensive application of Weiner's attributional theory to health settings. This study examined the relationship between efficacy beliefs and causal attributions on affective reactions midway during a five month structured exercise program. All three casual dimensions were related to positive affect but the dimension of personal control had the greatest influence. Self-efficacy mediated this cognition-affect

relationship with more efficacious subjects making causal attributions that were more internal and personally controllable than they were stable.

The rehabilitation process is not a static one and therefore an athlete's appraisal of an injury, the resulting emotional responses and behavioural consequences are continually changing as recovery occurs (see Figure 1). McAuley (1991), in his examination of attributional and affective responses to exercise participation, asked how and when during exercise should one measure affect. Generally, most of the applied attribution studies have utilised a cross-sectional design rather than a longitudinal one (Peterson, 1990). Therefore, ideally, attributions and affects need to be assessed at several points in time during rehabilitation. One of these time points must be soon after the injury occurs when attributional search is greatest and the emotional reactions to the injury are most pronounced. In addition, as a minimum requirement, it would also seem cogent to assess attributions and affects half-way through recovery and at the end of rehabilitation.

The Role of Expectancies and Consequences of the Injury

Peterson (1990, p.72) expresses the caution, "Let us not be attributional chauvinists. Causal explanations do not exhaust the thoughts that determine one's behaviour." Expectations and beliefs about one's ability to cope with negative events and the consequences of the event are probably just as important. The self-efficacy or confidence of subjects to overcome obstacles in an exercise program has already been shown to be one variable mediating the attribution-affect relationship (McAuley,

1991). Perhaps more efficacious subjects can successfully overcome setbacks and difficulties during rehabilitation of sporting injuries. Therefore, these efficacious subjects will expect to recover faster.

Expectancy beliefs also play a key role in attribution theory. Weiner (1986, p. 115) has stated:

> If the outcome of an event is ascribed to a stable cause, then that outcome will be anticipated with increased certainty, or with increased expectancy, in the future. If the outcome of an event is ascribed to an unstable cause, then the certainty or expectancy of that outcome may be unchanged, or the future will be anticipated to be different from the past.

The Grove et al. (1990) finding that the attributions for slow recovery were less stable than those for fast recovery and therefore functional for recovery makes sense in light of Weiner's comments. However, attributions for slow recovery that are more stable (e.g., "I always recover slowly from injuries") would be predicted to be extremely nonfunctional. In this case, the subject would expect the slower recovery to continue. Unfortunately, as Weiner (1986) indicates, very few studies in the attribution area also include measures of expectancies. The goal of the present study is to include a measure of expectancy. It seems appropriate to ask subjects at the beginning of physiotherapy treatment how fast they expect to recover from their injury. It is hypothesised that those subjects who expect to recover faster at the beginning of treatment will in fact recover faster.

The model discussed in Figure 1 and in most schools of clinical psychology (e.g., Walen, DiGiuseppe, & Wessler, 1980) emphasise the importance of the consequences

of an event influencing cognitions and affective processes. The consequences of an injury and hence reactions to it will be more pronounced in, for example, an athlete who will miss out on competing in a national competition compared to someone who will simply miss out on some training sessions. In fact, the Gordon et al. (1991) study on physiotherapists' perception of the reactions of athletes to injury indicated that the timing of the injury appeared to be the most critical factor affecting athlete reactions. In other health domains (e.g., chronic pain), the consequences of the illness are manifested through secondary gain issues. For example, compensation and insurance claims may well act to maintain the sick behaviour and retard recovery. Therefore, in addition to causal attributions, it seems important to also measure the perceived consequences of an injury. If subjects perceive the negative consequences of the injury as more important than any positive consequences, it would be expected that the subjects would be more motivated to recover quickly.

The Relationships between Attributions, Affect and Recovery Outcomes

The discussion presented thus far has emphasised that to understand the recovery process it is important to know how a person appraises the situation, in particular their attributions for the causes of their injury and rehabilitation. In turn, attributions influence affective reactions. Table 2 showed that specific attributions are related to particular affects. Finally, it is this combination of attributional and affective processes that determine rehabilitation outcomes. That is, the study predicts a strong

relationship between attributions, affects and rehabilitation outcomes. At this point in time it is necessary to discuss what is meant by the term rehabilitation outcomes.

An examination of the general health literature seems to make the distinction between self-report measures of physical well-being and objective outcome measures of physical well-being. For example, in investigating the relationship between negative life events and self-report measures of well-being, only about 10-15% of the variance has been accounted for in studies utilising prospective designs. This variance decreases to 5% when objective health measures are used (Smith, Smoll, & Ptacek, 1990). An example of an injury study using self-report measures is the McDonald and Hardy (1990) study of affective responses during rehabilitation where the athlete was simply asked for a perceived rehabilitation rating using a 0-100% scale. In contrast, the Ievleva and Orlick (1991) study of mental links to enhanced healing defined recovery outcomes more objectively by using an 85-90% level of function based on the physiotherapist's assessment using self-report and physiological information. Finally, the Grove et al. (1990) study used neither measures since speed of recovery was the independent variable along which subjects made their attributions. In a non-sport but health setting Taylor, Lichtman, & Wood (1984) developed a composite measure of physical and psychological adjustment to breast cancer. This measure of adjustment was based on several items but 76% of the variance was accounted for by the physician's GAIS (Global Adjustment to Illness Scale) rating, an interviewer's GAIS rating, the women's self-rating of adjustment, the women's summed report of psychological distress, the Cambell, Converse, & Rogers (1976) index of Well-Being score and the total score on the Profile of Mood States.

For the purposes of the present study investigating injury rehabilitation, objective health outcome measures might include the actual recovery period (e.g., from the time of injury to the final treatment session), the number of treatment cancellations, the delay in seeking treatment and the number of rehabilitation sessions. Subjective health outcome measures might include the subject's perception of recovery speed. It might be more appropriate to classify the former objective health outcome measures as behavioural variables while the latter subjective health outcome measure as a self-report variable.

Perceived Recovery and Actual Recovery Outcomes

One dilemma in assessing recovery outcomes by solely collecting either behavioural or self-report measures is that they may not provide a clear picture of the whole recovery process. For example, a useful behavioural measure of recovery might be the recovery time calculated from the first physiotherapy appointment to the final physiotherapy appointment. However, does recovery time indicate 100% rehabilitation? Probably not, as there are numerous examples of athletes returning to their sport and immediately getting reinjured. It seems likely that these athletes are less than 100% recovered. Some support for this is provided by Crossman, Jamieson and Hume (1990) who found that athletes tend to underestimate the disruptive impact and the short term effects of the injury compared to medical professionals (physiotherapist or physician).

Similarly, the possibility exists that athletes' self-reported recovery might indicate that they need further rehabilitation and yet measurements of range of motion of joints and strength of muscles by physiotherapists might indicate that the athlete is sufficiently recovered. Clearly, there may be cases where perceived or self-reported recovery does not match actual recovery. Such cases might include more severe injuries or where patients recover faster or slower than expected. The athlete who seems to recover faster might simply indicate complete recovery and yet their criterion for complete recovery (e.g., 70% rehabilitated) is in fact lower than for those that recover slowly (e.g., 90% rehabilitated). Similarly, the severity of the injury may alter athletes' perception of their recovery and the adoption of different criterions for complete recovery. Therefore, the present study needs to examine both perceived and actual recovery between subjects with different severity of injuries and recovery rates throughout rehabilitation. Collection of both measures may help to validate whether subjects who completed treatment actually perceived themselves to be rehabilitated.

Statement of Objectives

Each of the sections on causal ascriptions, attributions, affects, expectancies and consequences of the injury, rehabilitation outcomes and finally perceived and actual recovery have provided clear theoretical and empirical bases for the hypotheses of the present study. In summary, the present study utilises a longitudinal design to assess attributions and affects soon after an actual injury, about midway through rehabilitation and at the end of rehabilitation in active people. Recovery outcomes are evaluated utilising both behavioural and self-report measures. Finally, expectancy

beliefs for recovery and the consequences of the injury are also assessed as additional factors possibly mediating the recovery process. Specifically the study sought to examine:

(1) Subject's reasons or causal ascriptions for the causes of their injury and rehabilitation. This was exploratory with no specific predictions.

(2) The differences in attributional dimensions as rehabilitation progresses between subjects with different severity of injuries and different recovery speeds. It was hypothesised that as rehabilitation progresses, subjects who recover faster will show an attributional pattern that has a progressively more internal locus of causality, more personal control, less external control and more stability. In contrast, subjects who have more severe injuries might be expected to have the opposite attributional pattern, especially at the beginning of rehabilitation.

(3) The severity of injury or healing speed on affect throughout rehabilitation. It was hypothesised that subjects with more severe injuries or slow recoveries experience greater negative affect and pain throughout rehabilitation.

(4) Differences in perception of recovery between subjects with different severity of injuries and recovery rates throughout rehabilitation. This was exploratory with no specific predictions. It was important to also validate whether subjects who completed treatment actually perceived themselves to be rehabilitated.

(5) The role of expectancy beliefs and consequences of the injury in mediating attribution-affect relationships and the recovery process. It was predicted that subjects who expect to recover faster and perceive greater negative consequences for their injury were more motivated to actually recover faster.

(6) The relationship between attributional dimensions and affect during recovery. It was predicted that subjects who recover more slowly from athletic injuries or have more severe injuries will primarily attribute poorer recovery to internal, stable, personally uncontrollable and externally controllable factors and that the athletes with this attributional pattern will experience greater negative affect.

Method

Subjects and Procedure

Participants in the study were 95 Australian Defence Force Academy students and Duntroon Royal Military College recruits who attended the Physiotherapy Centre for rehabilitation of their injuries by the physiotherapists. Ten subjects didn't satisfy the criteria of lateral collateral ligament ankle sprains because of fractures of the ankle or other damage and therefore were eliminated from the study. A further nine subjects were also excluded because of a lack of data that occurred as a result of quitting the army, moving interstate, inability to obtain medical records or even imprisonment. This left 76 subjects with ankle lateral ligament injury: 19 subjects with grade I injury (i.e., minor severity), 54 subjects with grade II injury (i.e., moderate severity) and three subjects with grade III injury (i.e., severe injury). Because of the small number of the grade III subjects, they were also excluded. This left a total of 73 grade I and II subjects participating in the study. 54 subjects were male and 22 subjects were female. The mean age of the subjects was 21.9 years (SD = 3.8).

All subjects attending the Physiotherapy Centre for ankle injuries were asked if they would like to participate in a "survey examining the psychological side of sports injury and rehabilitation". If they agreed, they were then given a consent form followed by the *Initial Injury Evaluation* to complete. The *Initial Injury Evaluation* assessed (1) the subject's attributions for the causes of the injury, (2) the subject's reactions to the injury, (3) the consequences of the injury and their importance, (4) the

subject's expectations for a fast recovery and (5) the subject's perceived percent rehabilitation at that point in time.

Thereafter, subjects completed the *Weekly Injury Evaluation* once a week about their injury during the past week. It also assessed their perceptions of the intensity of pain associated with the injury and their perception of the extent of their rehabilitation to this point in time. If the subjects perceived themselves as about half-way or more towards recovery (defined as over 45% rehabilitated) they also completed further questions assessing their attributions for the causes of this rehabilitation.

Finally, on termination of the last physiotherapy session, subjects completed the *Final Injury Evaluation.* It assessed each subject's perception for how fast they recovered and the attributions for the causes of this recovery. Similar to the *Weekly Injury Evaluation* it also assessed the subject's feelings and emotions about the injury during the previous week and their perceived percent rehabilitation. Finally, subjects were asked to write anything that might be helpful in future research.

The physiotherapist evaluated each subject after their final treatment session with the *Physiotherapist's Evaluation of Subject* form. This assessed each subject's motivation in rehabilitation.

All consent forms and questionnaires were administered by one of four physiotherapists at the Physiotherapy Centre. To gain their cooperation and assistance, they were familiarzed with the general purpose of the experiment but not the specific

hypotheses and expectations. All forms and questionnaires were colour coded to assist the physiotherapists in their administration. At the beginning of the study, the physiotherapists were instructed in the procedures of the experiment and were provided with a flow chart summarising these procedures. Copies of the consent form, questionnaires and flow chart are provided in the Appendix.

Each week the experimenter visited the Physiotherapy Centre to check progress, solve any procedural problems, collect forms and check the subject's medical records for dates of treatment and cancellations.

Instrumentation

Attributions

Subjects' attributions were assessed at three points in time: (1) At the beginning of the injury – What are the three most likely causes of your injury? (2) Midway during rehabilitation (i.e., over 45% rehabilitation) – What is the most important cause for your rehabilitation to date? (3) At the end of rehabilitation (i.e., at the final physiotherapy treatment session) – What is the most important cause for this recovery rate? Subjects then rated each reason along 12 scales: three scales designed to measure locus of causality, three scales for stability, three scales for personal control and three scales for external control. For each causal dimension total values can range from 3 to 27 with the higher values representing attributions that are more internal, stable, personally controllable and controllable by others.

This administration and scoring format is based on the revised Causal Dimension Scale (CDSII) developed by McAuley, Duncan and Russell (in press). This scale distinguishes between causes that are controlled by the individual and causes controlled by other people, unlike the original CDS (Russell, 1982). There is some empirical support (McAuley, 1991) for this more finely graded classification of the controllability dimension of earlier studies. For example, a subject who lists "lack of training" for the question "Why do you think you got injured?" is to respond along a nine-point scale anchored at the extremes by the responses "reflects an aspect of yourself" and "reflects an aspect of the situation". This is a locus of causality scale. Similarly, one of the stability scales is anchored at each end with the responses "is the cause something that is: permanent" or "temporary". The personal control scale asks "is the cause: manageable by you " or "not manageable by you ". Finally, the external control scale is anchored at each end with the responses, "is the cause something over which others have control " or "over which others have no control".

An examination of the psychometric data of the CDSII across four studies (McAuley et al., in press) showed average internal consistencies for each of the attribution measures as follows: locus of causality, .67; stability, .67; personal control, .79; and external control, .82. Similarly, a confirmatory factor analysis supported the factor structure of the CDSII (McAuley et al., in press).

Affective Reactions

The subject's emotions and feelings about their injury during the past week were assessed using the Positive Affect and Negative Affect Scales (PANAS) developed by

Watson, Clark and Tellegen (1988). The PANAS, as its name indicates, consists of two 10-item mood scales that measure both positive and negative affect. The positive affect scale measures the extent to which a person feels attentive, interested, alert, excited, enthusiastic, inspired, proud, determined, strong and active. The negative affect scale measures the extent to which a person feels distressed, upset, hostile, irritable, scared, afraid, ashamed, guilty, nervous and jittery. The subject was asked to rate each emotion or feeling along a 5-point rating scale (i.e., 1 = very slightly or not at all to 5 = extremely). Therefore, the total values for each mood scale could range from 5 (representing very little affect) to 50 (representing extreme affect). The scales have been shown to be largely uncorrelated, highly internally consistent and with good item and external validity (Watson, Clark, & Tellegen, 1988).

Consequences of Injury

During the *Initial Injury Evaluation* questionnaire, two statements were asked to assess both the positive and negative consequences of the injury to the subject: "What are the (negative/positive) consequences of the injury to you? Please describe the most important". The subject then rated the importance of each consequence on a 9-point Likert scale ranging from "9 = very important" to "1 = not at all important".

Expectations for Recovery

In the *Initial Injury Evaluation* questionnaire, subjects were asked how fast they expected to recover from their injury by using an 8-point scale ranging from a period

of one week to greater than four months. Each subject then had a measure in days of how long they expected for rehabilitation.

Perceptions of Recovery Speed

Subjects at their last treatment were administered the *Final Injury Evaluation* questionnaire, which assessed their perceptions of how fast they recovered from their injury on a 9-point Likert rating scale ranging from 1 = very slowly to 9 = very quickly.

Perceptions of Pain and Rehabilitation

All three injury evaluation questionnaires assessed the subjects' perceptions of the intensity of the pain associated with their injury by again using a 9-point Likert scale ranging from 1 = no pain at all to 9 = very severe pain. The subjects then simply estimated their percent rehabilitation at that point in time. In the *Weekly Injury Evaluation* questionnaire, if this percentage rehabilitation figure was over 45%, subjects indicated the most important cause for their rehabilitation and answered the associated attribution questions.

Physiotherapist's Evaluation of Subject

The *Physiotherapist's Evaluation of Subject* form consisted of twelve items assessing the subject's motivation in rehabilitation. Five of the items described positive aspects of rehabilitation, for example, "The subject worked hard in rehabilitation". Seven of the items described negative aspects of rehabilitation, for example, "Didn't follow the

rehabilitation program outside physiotherapy". Each item was rated on a Likert scale from 1 = strongly disagree to 7 = strongly agree.

The items were adapted from the work of Gordon, Milios and Grove (1991) with physiotherapists who have described these items or behavioural responses as indicative of a subject's attitude towards treatment and rehabilitation.

Analysis of Data

Attributions, affect and perceived rehabilitation variables were measured over time. Three points in rehabilitation were chosen for analysis: the first treatment session, the mid treatment session and the final treatment session. The first treatment session was defined as the subject's first appointment with the physiotherapist at the Physiotherapy Centre. The mid treatment session was defined as the median point of a subject's total number of physiotherapy sessions. If a subject attended an even number of sessions, the median point was the average of the two middle sessions. The final treatment session was the subject's last treatment at the Physiotherapy Centre.

All other variables were measured once and provided some measure of recovery. As a result, these latter variables will be referred to as recovery outcome variables and included both behavioural and self-report measures. The behavioural measures were:

(1) Recovery Period - The time in days from the date of injury to the final treatment session.

(2) Cancellations - The number of appointments made but were unable to be attended.

(3) Delay in Seeking Treatment - The time in days from the date of injury to the first treatment session.

(4) Number of Rehabilitation Sessions - The total number of treatment sessions attended by the subject.

(5) Physiotherapist's Negative & Positive Evaluation - Each subject received a positive and a negative evaluation score (a maximum of 35 and 49 respectively) of their motivation in rehabilitation.

The self-report measures have already been described and included the subject's perception of recovery speed, recovery expectations and the negative and positive consequences of the injury. Strictly speaking, recovery expectations and the negative and positive consequences of injury are not recovery outcomes since they are measured at the first treatment session. They are hypothesised to mediate recovery outcomes by affecting motivation for rehabilitation. Nevertheless, since they were only measured once, they can be conveniently grouped with the other recovery outcome variables as dependent variables for statistical analyses.

Three sets of data were analysed: (1) comparisons between subjects based on the severity of injury (grade I and grade II injuries), (2) comparisons between subjects based on healing speed (fast and slow healers) and (3) relationships among causal dimensions, affect and recovery outcome variables. Between group differences in attributions, affect and perceived rehabilitation were measured over time using

repeated measures analysis of variance techniques while group differences in recovery outcome variables were analysed with multivariate analysis of variance techniques. Finally, relationships among causal dimensions, affect and recovery outcome variables were examined using Pearson product moment correlations and hierarchical multiple regression techniques.

Results

The results are presented in five sections. Firstly, descriptive statistics are presented with regard to the causal ascriptions for injury and rehabilitation. Means and standard deviations for all variables are provided. The next section is an exploratory data analysis screening for missing data and the assumptions of multivariate tests. The third section examines differences between subjects with grade I and grade II injuries while the fourth section is a comparison of fast and slow healers. The final section examines the relationships among causal dimensions, affect and recovery outcome variables.

Descriptive Statistics

Results of the content analysis of the subjects' reasons or causal ascriptions for the causes of their injury and the frequency of their responses are shown in Table 3. These ascriptions were classified into seven domains: 1. Technical/mechanical (e.g., running too fast, heavy landing, twisting ankle too far); 2. Environmental (e.g., holes, uneven ground, dark); 3. Physical (e.g., weak ankles, fatigue, previous injury); 4. Opponent (e.g., person stepping on ankle, being pushed, landing on someone's foot); 5. Psychological (e.g., lack of concentration, too aggressive); 6. Equipment (e.g., shoes, heavy load); and 7. Luck (e.g., unlucky, fate). Subjects were most likely to attribute the cause of their injury to technical/mechanical causes, such as landing off balance or landing too heavily. When subjects were asked for up to three reasons for their injuries, then more consideration was given to other possible causes. In fact, a larger emphasis then seemed to be placed on physical (e.g., weak ankles) and psychological

(e.g., lack of concentration) reasons for injury. Interestingly, very few subjects attributed the cause of their injury to simply being unlucky.

Table 3 Frequency of Causal Ascriptions for Injury

Category	Main Cause		Second Cause		Third Cause	
	Freq.	%	Freq.	%	Freq.	%
Technical/Mechanical	30	41%	21	33%	12	21%
Environmental	19	26%	11	17%	4	7%
Physical	9	12%	16	25%	18	32%
Opponent	7	10%	2	3%	3	5%
Psychological	5	7%	7	11%	15	26%
Equipment	2	3%	6	9%	4	7%
Luck	1	1%	1	2%	1	2%

In contrast to the causes of injury, Table 4 displays subjects' ascriptions for their rehabilitation and the frequency of their responses. As might be expected, nearly 40% of all the responses included physiotherapy as the major cause of rehabilitation. Also rest (22%) and exercise (19%) played an important part in their recovery. Very few subjects perceived psychological factors, such as a positive attitude, as playing a major part in their rehabilitation. Many of the subjects, despite being asked to "consider the most important cause for this recovery rate," identified several causes such as physiotherapy, rest and exercise in their responses. As a result, it may have been more appropriate to ask subjects to delineate between the three major causes of their rehabilitation similar to the measurement of their causal ascriptions for injury.

Table 4 Frequency of Causal Ascriptions for Rehabilitation

Ascription for Rehabilitation	Frequency	Percentage
Physiotherapy	27	39%
Rest	15	22%
Exercises	13	19%
Time	6	9%
Caution/Patience	4	6%
Positive Attitude	2	3%
Strapping	1	1%
Immediate Treatment	1	1%

Tables 5 and 6 detail the descriptive statistics with respect to causal dimensions, affect and recovery outcome variables for the beginning, middle and end of rehabilitation. Subjects perceived their primary causal dimensions for the causes of injury to be moderately personally controllable, not controlled by others, fairly unstable and with a somewhat external locus of causality. This attribution pattern confirms the classification for the reasons for injury (from Table 5) which are due to predominantly technical/mechanical factors which are to some extent under the control of the individual. However, the magnitude of these attribution dimensions is not strong because of the part played by environmental factors in the cause of the injury. It is assumed that environmental causes of injury would lead to an attributional pattern that is low on all dimensions.

Table 5 Descriptive Statistics for Attributional and Affective Variables Measured at the Beginning, Middle and End of Rehabilitation.

First Treatment			Mid Treatment			Final Treatment		
Variable	*M*	*SD*	Variable	*M*	*SD*	Variable	*M*	*SD*
Locus of Causality	11.7	6.3	Locus of Causality	17.0	6.7	Locus of Causality	14.6	5.9
Personal Control	13.4	7.7	Personal Control	19.8	6.1	Personal Control	18.1	6.0
External Control	9.8	6.6	External Control	13.5	6.2	External Control	13.6	5.7
Stability	11.6	5.6	Stability	12.5	5.8	Stability	13.3	5.7
Negative Affect	22.8	6.9	Negative Affect	16.7	6.0	Negative Affect	15.1	6.6
Positive Affect	19.9	5.8	Positive Affect	23.8	7.5	Positive Affect	24.2	8.4
Pain Intensity	5.5	1.9	Pain Intensity	3.3	1.5	Pain Intensity	2.7	1.7
Percentage Rehab.	39.0	27.5	Percentage Rehab.	69.6	17.0	Percentage Rehab.	81.9	18.5

Note: Total values for each causal dimension can range from 3 to 27 with the higher values representing attributions that are more internal, stable, personally controllable and controllable by others. Total values for each mood scale range from 5 (representing very little affect) to 50 (representing extreme affect). Pain intensity ranges from 1 = no pain at all to 9 = very severe pain.

In contrast to the pattern of attributional dimensions for the causes of injury, it seemed that subjects perceived their recovery as being under their personal control, moderately internal and somewhat under external control and stable. This pattern of attributional dimensions is again consistent with subjects causal ascriptions for rehabilitation, given that the majority of subjects perceived their rehabilitation as due to physiotherapy, rest and exercise. Interestingly, subjects perceived themselves as nearly 40% recovered by the first time they saw a physiotherapist (from Table 5) which was on average some nine days after their injury (from Table 6). However, it was expected that the severity of the injury plays an important part in recovery outcomes, with possibly attributional and affective measures mediating these

outcomes. Therefore, further analyses required a comparison of grade I and grade II injuries

Table 6 Descriptive Statistics for Recovery Outcome Variables

Variable	*M*	*SD*
Recovery Period (days)	37.9	33.7
Cancellations	0.75	1.1
Delay in Seeking Treatment (days)	9.0	12.1
Negative Consequences	8.2	1.5
Positive Consequences	2.5	2.4
Physiotherapists' Negative Evaluation	15.4	5.7
Physiotherapists' Positive Evaluation	27.2	5.5
Number of Rehabilitation Sessions	7	5.1
Perception of Recovery Speed	5.1	1.9
Recovery Expectations (days)	21.1	13.4

Exploratory Data Analysis

An exploratory data analysis was conducted on all variables for both grade I and grade II injuries using SPSS Explore for accuracy of data entry, missing data and fit between their distributions and the assumptions of univariate and multivariate analysis. There were two main sources of concern. Firstly, the distributions for the following variables were all severely skewed: age, cancellations, delay in seeking treatment, negative consequences, positive consequences, positive evaluation by the physiotherapist, number of rehabilitation sessions, recovery period and recovery expectations. As a result these distributions were transformed to approximate more

normal distributions (see Table 7). Since transformations of variables may be more difficult to interpret (Tabachnick & Fidell, 1989), these transformations will only be referred to when results of statistical analyses are different from their untransformed distributions.

Table 7 Transformation Functions for Skewed Variables in SPSS

Variable	Transformation Functions
Age	LG10 (Age - 18)
Cancellations	1 / (Cancellations + 1)
Delay in Seeking Treatment	LG10 (Delay in Seeking Treatment)
Negative Consequences	1 / (10 - Negative Consequences)
Positive Consequences	1 / Positive Consequences
Physiotherapists' Positive Evaluation	SQRT (36 - Positive Evaluations)
Number of Rehabilitation Sessions	SQRT (Rehabilitation Sessions)
Recovery Period	LG10 (Recovery Period)
Recovery Expectations (days)	LG10 (Recovery Expectations)

The second main source of concern was the attrition of 20 subjects over the course of their rehabilitation and as a result failed to complete midpoint and/or final assessments. Follow-up letters and assessments were mailed to these subjects but there was only a 25% return rate (i.e., 5 replies). Because of the low return rate, it was not possible to test this data for patterns. As a result, both completed and incomplete data were combined with the assumption that the missing data was mixed randomly. The SPSS option of excluding cases pairwise was used because this option included more cases than if the default option of only including listwise data had been used.

Table 8 Missing Subject Data Compared to Complete Data at the End of Rehabilitation

Variable	*M*		*SD*		*t*
	Missing Subjects	Completed Subjects	Missing Subjects	Completed Subjects	
Age[1] (Transformed)	23.95	21.30	26.01	9.20	2.49*
Physiotherapists' Positive Evaluation	21.25	28.05	8.19	4.53	3.55***
Recovery Period (days)	19.06	43.19	20.94	34.77	2.64**
Number of Rehabilitation Sessions	3.13	8.09	2.58	5.19	5.27***

[a] $p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

Note: Physiotherapist's positive evaluation was the total of 5 questions measured on a Likert scale from 1 = strongly disagree to 7 = strongly agree.

The assumption that missing data was mixed randomly was explored by subdividing the data into two groups: the missing subject data compared to the complete data at the end of rehabilitation. A series of *t* tests were performed examining the distributions of all variables in the data matrix across these two groups (Norusis, 1993). Table 8 shows that subjects who didn't complete rehabilitation were significantly older; were evaluated less positively by the physiotherapists; recovered

[1] Age untransformed was nonsignificant but the transformed function of age was significant. Therefore, as stated in the Exploaratory Data Analysis section, when there is a dicrepancy between the two, the transformed version is indicated. However, to make sense of the data the untransformed means and standard deviations are presented here.

quicker; and had fewer rehabilitation sessions than the subjects who completed rehabilitation.

The result of a quicker recovery time by the subjects is understandable given that recovery time was defined as the period of time between the time of injury and the last physiotherapy appointment. Subjects with missing data, for whatever reasons, simply terminated rehabilitation earlier than those subjects with complete data. There appeared to be no other significant differences between the variables. These few significant differences provided support for combining complete and incomplete data for analysis.

Comparisons of Subjects with Grade I and Grade II Injuries

In order to examine the effects of rehabilitation over time, a series of repeated measures analysis of variance were conducted with grade of injury (grade I and grade II) as the between subjects factor and time (first , middle and final treatment) as the within subjects factor. Dependent variables were: locus of causality, personal control, external control, stability, negative affect, positive affect, pain intensity and perceived percentage rehabilitation. None of the two-way interactions for both grade of injury and rehabilitation time were significant ($p > .05$) and therefore the main effects for rehabilitation time and grade of injury were explored.

The main effects of rehabilitation time for negative affect, $F(2, 66) = 14.7, p < .001$; pain intensity, $F(2, 66) = 14.64, p < .001$; and percentage rehabilitation, $F(2, 64) =$

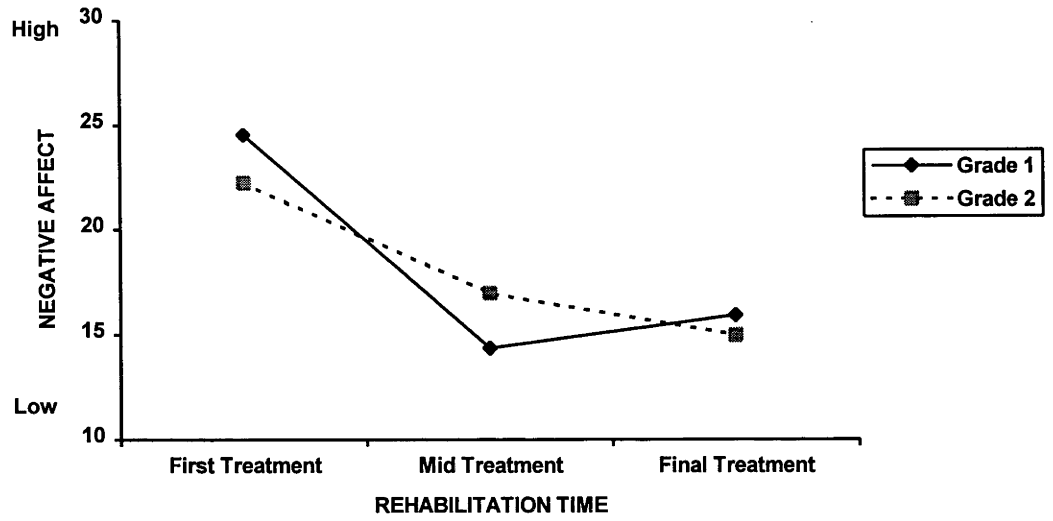


Figure 3. Mean negative affect as a function of the time of rehabilitation.

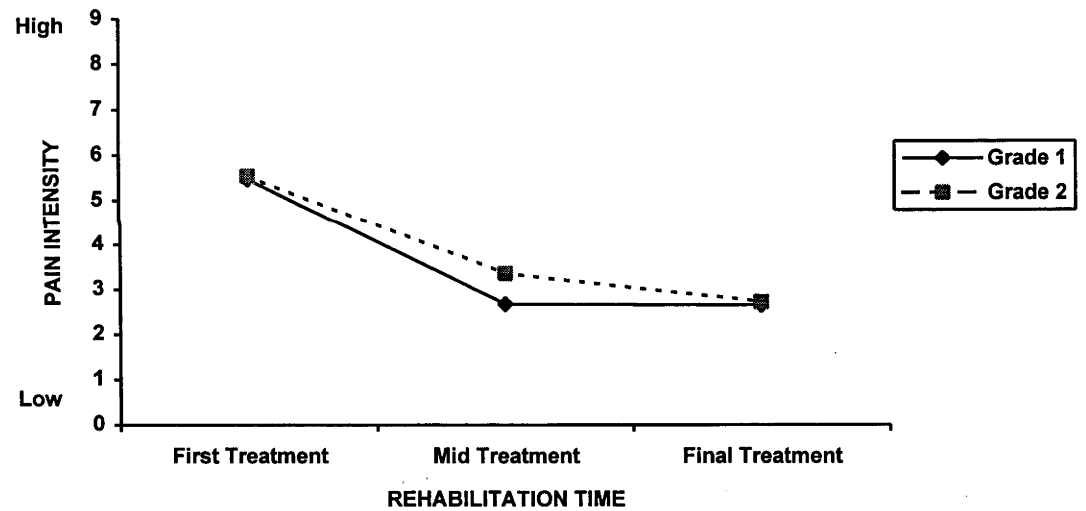


Figure 4. Mean pain intensity across rehabilitation for Grade I and Grade II injuries.

14.19, $p < .001$ were all significant. These results are shown in Figures 3, 4 and 5 respectively which indicate that subjects with both grade I and II injuries perceived less negative affect , less pain and greater rehabilitation as recovery progressed. Interestingly, unlike negative affect, positive affect didn't significantly increase as

recovery progressed, $F(2, 66) = .48, p > .05$. All other main effects for either grade of injury or rehabilitation time were also non-significant ($p > .05$).

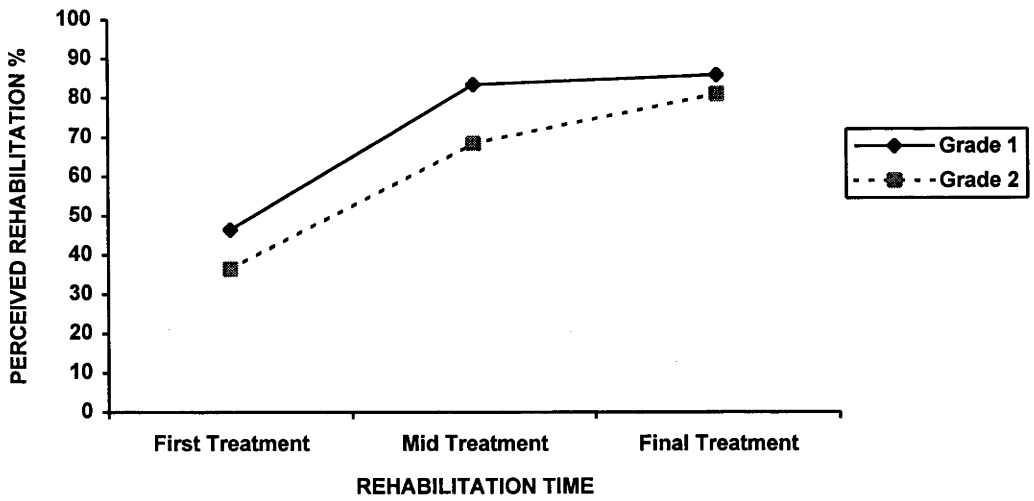


Figure 5. Perceived rehabilitation across rehabilitation for Grade I and Grade II injuries

Two multivariate analysis of variances were conducted examining recovery outcomes between subjects with grade I and grade II injuries using SPSS. This was to avoid the substantial loss of data that would have occurred if the physiotherapist's evaluations and the perception of recovery speed were included in the first analysis since these variables were measured at the end of rehabilitation with the resultant attrition in subjects. Therefore, a one-way multivariate analysis of variance was performed between subjects with grade I and grade II injuries on the seven dependent recovery outcome variables of recovery period, cancellations, delay in seeking treatment, negative consequences, positive consequences, number of rehabilitation sessions and recovery expectations.

Table 9 MANOVA Results between Subjects with Grade I and Grade II Injuries on Recovery Outcome Variables

Variable	*M*		*SD*		df	Univariate
	Grade I	Grade II	Grade I	Grade II		*F*
Recovery Period (days)	22.28	44.27	18.82	36.43	1/71	6.73*
Cancellations	.39	.89	.70	1.17	1/71	3.48[a]
Delay in Seeking Treatment (days)	7.33	10.04	5.98	13.77	1/71	.70
Negative Consequences	8.17	8.46	1.50	1.11	1/71	.20
Positive Consequences	2.22	2.62	1.73	2.61	1/71	.39
Physiotherapists' Negative Evaluation	13.86	14.07	4.91	4.82	1/33	.01
Physiotherapists' Positive Evaluation	28.29	27.86	5.82	5.46	1/33	.03
No. of Rehabilitation Sessions	4.56	7.92	4.26	5.27	1/67	5.98*
Recovery Expectations (days)	15.56	23.29	6.60	14.77	1/67	4.58*
Perception of Recovery Speed	5.29	5.04	2.50	1.84	1/33	.09

[a] $p < .1$, *$p < .05$, **$p < .01$, ***$p < .001$

Negative and positive consequences were measured on a Likert scale from 1 = not important to 9 = very important. Perception of recovery speed was measured on a Likert scale from 1 = very slowly to 9 = very quickly. Physiotherapist's positive evaluation was the total of 5 questions measured on a Likert scale from 1 = strongly disagree to 7 = strongly agree. Physiotherapist's negative evaluation was the total of 7 questions measured on a Likert scale from 1 = strongly disagree to 7 = strongly agree.

The MANOVA was insignificant, Wilks's lambda = 0.85, $F(7, 65) = 1.68, p > .05$. The second one way multivariate analysis of variance was also conducted using the grade of injury of the subjects as the between subject's variable but on the three dependent variables of the physiotherapist's positive evaluation, negative evaluation and subject's perception of the recovery speed. This MANOVA was also insignificant, Wilks's lambda = .99, $F(3, 31) = .04, p > .05$.

Since these two MANOVAs are insignificant, the combined univariate results are listed in Table 9 as a tentative interpretation and guide to future research only (Tabachnick & Fidell, 1989). It appears that subjects with grade I injuries recovered significantly faster, had fewer sessions and expected to recover faster than subjects with grade II injuries. None of the physiotherapists' evaluations significantly differentiated between the recoveries of the subjects with grade I and grade II injuries. Table 9 reveals that subjects with grade I injuries expected to recover significantly faster than subjects with the more severe grade II injuries. More importantly, it seems that subjects with grade II injuries significantly underestimated the length of recovery ($M = 22.88$ days[2]) compared to the actual recovery period ($M = 43.74$ days), $t(53) = 4.81, p < .001$. However, for subjects with grade I injuries, while underestimating the length of recovery ($M = 16.03$ days) compared to the actual recovery period ($M = 21.32$ days), this difference was not significant, $t(19) = 1.18, p > .05$.

[2] Means are slightly different from Table 9 since the *t* tests are calculated on different numbers of subjects from the MANOVA.

Comparisons of Fast and Slow Healers

Since subjects with grade I injuries recovered significantly faster than subjects with grade II injuries, all subjects with grade I injuries were omitted and only the data pertaining to grade II injuries was further analysed. Subjects with grade II injuries were ranked according to their recovery time (i.e., the subject with the fastest recovery time was ranked No. 1, the second fastest, No. 2 etc.) and then divided into three equal groups of 18 subjects: fast healers, average healers and slow healers. Table 10 shows that fast healers recovered from their ankle injuries between 7 and 19 days; average healers between 19 and 46 days; and slow healers between 46 and 178 days. A one-way ANOVA confirmed this classification , $F(2, 51) = 58.36, p < .0001$. The Least Significance Difference test confirmed that all groups were significantly different from each other in mean recovery times, $p < .05$.

Table 10 Distribution of the Healing Groups According to Recovery Times (in days)

	M	*SD*	Minimum	Maximum
Fast Healers	13.66	3.91	7	19
Average Healers	33.50	9.04	19	46
Slow Healers	84.06	33.49	46	178

A series of repeated measures analysis of variance were conducted with healing speed as the between subjects factor and rehabilitation time as the within subjects factor in order to examine the effects of rehabilitation over time. Dependent variables were

again: locus of causality, personal control, external control, stability, negative affect, positive affect, pain intensity and percentage rehabilitation.

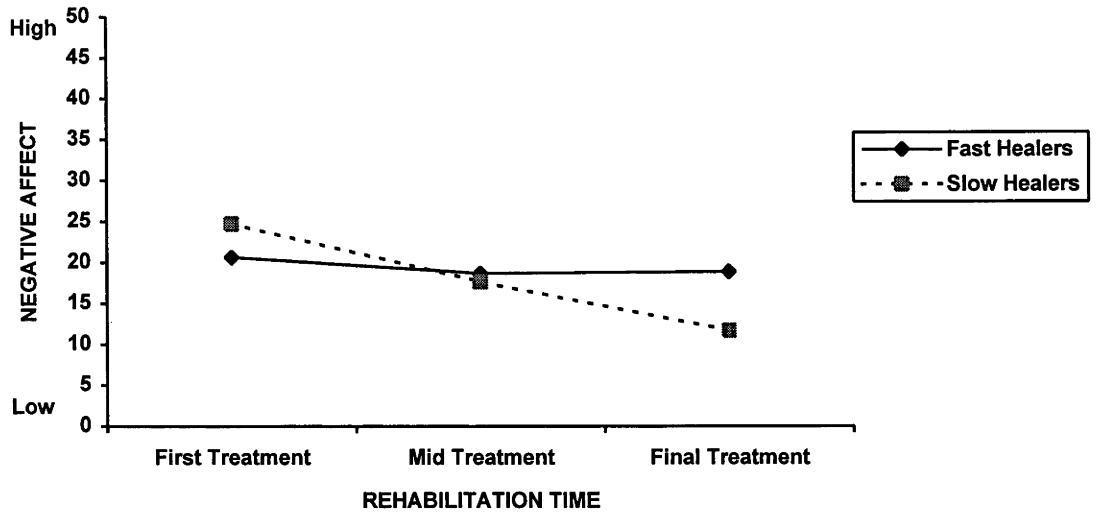


Figure 6. Mean negative affect across rehabilitation for Fast and Slow Healers.

Only the two-way interaction of healing speed and negative affect was significant, $F(2, 34) = 4.13, p < .05$[3]. This relationship is shown in Figure 6. Fast healers appeared to have significantly more negative effect at the final treatment than slow healers, $F(1, 17) = 5.78, p < .05$. The main effects of rehabilitation time and healing speed were therefore further examined. The main effects of rehabilitation time for negative affect, $F(2, 34) = 13.87, p < .001$ (Figure 6); pain intensity, $F(2, 34) = 25.29$, $p < .001$ (Figure 7); and perceived rehabilitation, $F(2, 32) = 26.24, p < .001$ (Figure 8) were all significant. This indicates that as rehabilitation progressed, negative affect and pain intensity decreased and perceived rehabilitation increased irrespective of the healing speed of the groups. The main effect of healing speed for personal control just

[3] Mauchly's sphericity test was significant ($p < .05$) for both negative affect and percentage rehabilitation. The Huynh-Feldt epsilon correction to the degrees of freedom was applied but since this did not effect the level of significance for each variable, the uncorrected degrees of freedom are the ones reported here.

failed to reach significance, $F(2, 30) = 3.07$, $p = .06$. The main effect of healing speed is shown in Figure 9. It appeared that fast healers perceived greater personal control over the causes of injury but not in recovery.

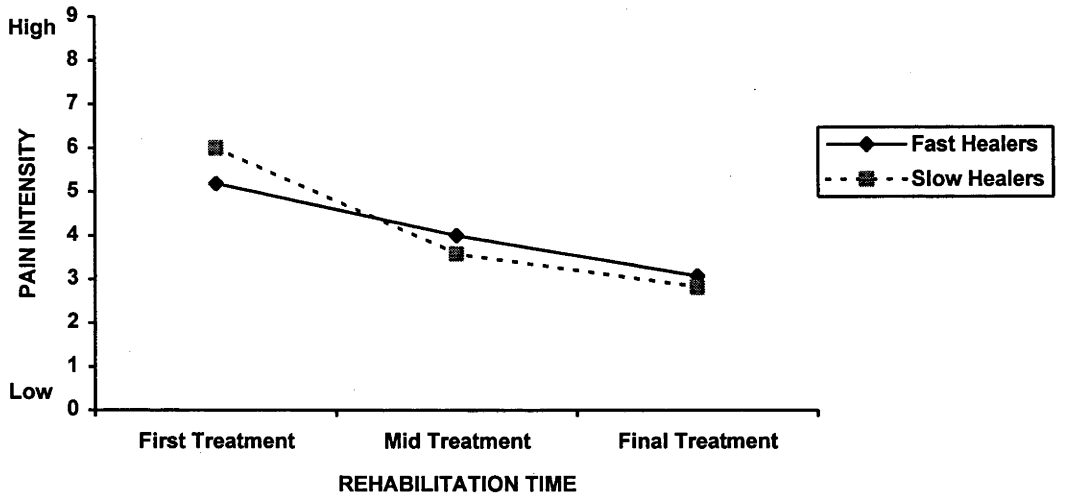


Figure 7. Mean pain intensity across rehabilitation for Fast and Slow Healers.

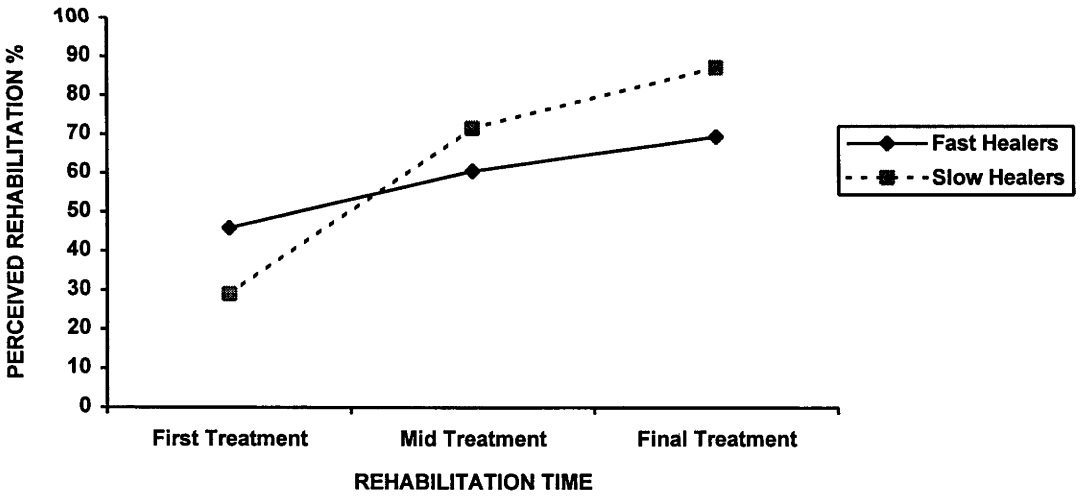


Figure 8. Mean perceived rehabilitation across rehabilitation for Fast and Slow Healers.

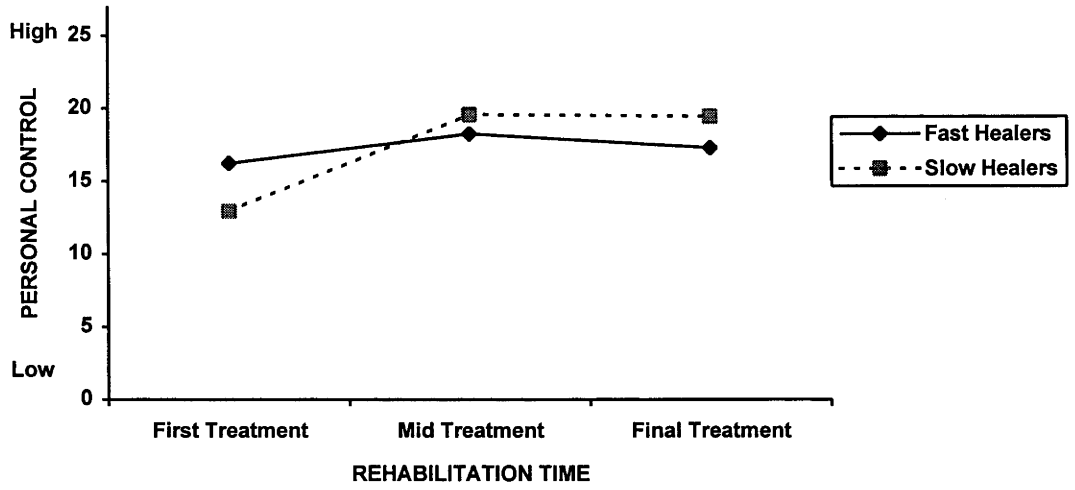


Figure 9. Mean personal control across rehabilitation for Fast and Slow Healers.

The hypothesis that fast healers recover quicker because they have an optimistic attributional style and/or experience less negative affect overall compared to slow healers was examined by conducting a one-way MANOVA comparing fast and slow healers on the dependent variables of mean overall values for: locus of causality, personal control, external control, stability, negative affect, positive affect and pain intensity experienced throughout rehabilitation. The mean overall values for these variables were calculated from their respective values at the first, mid and final treatments. There were no multivariate significant differences on any of these variables between fast and slow healers, Wilks's lambda = .91, $F(7, 28) = .40$, $p > .05$.

Similar to the analysis with severity of injury, two multivariate analysis of variances were conducted examining recovery outcomes between fast and slow healers to avoid the substantial loss of data that would have occurred if the physiotherapists' evaluations and the perception of recovery speed were included with the analysis of

the other outcome variables. Therefore, a one-way multivariate analysis of variance was performed between fast and slow healers on the seven dependent recovery outcome variables of recovery period, cancellations, delay in seeking treatment, negative consequences, positive consequences, number of rehabilitation sessions and recovery expectations[4]. The MANOVA was significant, Wilks's lambda = 0.24, $F(7, 28) = 13.00, p < .001$. The second one way multivariate analysis of variance was also conducted using healing speed as the between subject's variable but on the three dependent variables of the physiotherapist's positive evaluation, negative evaluation and subject's perception of the recovery speed. This MANOVA was significant, Wilks's lambda = 0.54, $F(3, 15) = 4.20, p < .05$.

Table 11 shows the univariate results for these significant MANOVAs. Fast healers recovered significantly faster, sought rehabilitation earlier, had fewer rehabilitation sessions and expected to recover faster even before treatment had commenced. However, fast healers' expectations for recovery ($M = 16.41$ days) were consistent with their actual recovery period ($M = 13.66$ days[5]), $t(26.62) = 1.45, p > .05$. In contrast, slow healers significantly underestimated ($M = 29.16$ days) their actual recovery period ($M = 84.05$), $t(34) = 6.06, p < .001$. By their last physiotherapy session, fast healers also perceived their recovery to be significantly faster than the slow healers.

---

[4] Preliminary analyses indicated a significant univariate result for sex with males recovering faster than females, $F(1, 33) = 7.75, p < .01$. A MANOVA conducted with sex as a covariant seemed to play a minor role in recovery expectations but failed to reveal any major changes from those reported here for the MANOVA.

[5] Means are slightly different from Table 11 since the *t* tests are calculated on different numbers of subjects from the MANOVA.

Table 11 Recovery Outcome Measures between Fast and Slow Healers

Variable	*M*		*SD*		df	Univariate *F*
	Slow Healers	Fast Healers	Slow Healers	Fast Healers		
Recovery Period (days)	83.06	13.67	34.25	3.91	1/33	73.02***
Cancellations	1.35	0.72	1.37	0.96	1/33	2.52
Delay in Seeking Treatment (days)	12.29	5.33	14.40	3.10	1/33	4.02[a]
Negative Consequences	8.82	8.44	.39	.78	1/33	3.21[a]
Positive Consequences	2.71	3.00	2.87	2.91	1/33	.09
Physiotherapists' Negative Evaluation	9.89	10.40	12.42	11.23	1/16	.69
Physiotherapists' Positive Evaluation	9.89	10.4	12.42	11.23	1/16	.90
No. of Rehabilitation Sessions	12.22	3.72	5.24	1.67	1/33	43.25***
Recovery Expectations (days)	29.65	16.14	19.29	7.01	1/33	7.75**
Perception of Recovery Speed	4.09	6.63	1.81	0.74	1/16	13.75**

[a] $p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

Negative and positive consequences were measured on a Likert scale from 1 = not important to 9 = very important. Perception of recovery speed was measured on a Likert scale from 1 = very slowly to 9 = very quickly. Physiotherapist's positive evaluation was the total of 5 questions measured on a Likert scale from 1 = strongly disagree to 7 = strongly agree. Physiotherapist's negative evaluation was the total of 7 questions measured on a Likert scale from 1 = strongly disagree to 7 = strongly agree.

Relationships among Causal Dimensions, Affect and Recovery Outcome Variables

The combination of the temporal sequence of events and theoretical relationships between attributions, affect and rehabilitation outcomes allowed for the testing of relationships between variables employing hierarchical multiple regression equations. An additional consideration was the ratio of cases to independent variables. Tabachnick and Fidell (1989) recommend a minimum requirement of 5 times more cases than independent variables. Since there was a maximum of 54 subjects and often less given the pairwise deletion of variables with missing data, the attribution and affect variables over time were combined to reduce the number of independent variables. For example, the mean total locus of causality attribution dimension (M = 13.63, SD = 4.87) was calculated from the values of this dimension at the first, mid and final treatments. Total mean values for personal control (M = 16.49, SD = 5.56), external control (M = 11.72, SD = 4.55), stability (M = 12.73, SD = 4.56), negative affect (M = 18.72, SD = 5.21), positive affect (M = 22.77, SD = 5.619) and pain intensity (M = 4.09, SD = 1.54) were similarly calculated. Table 12 shows the correlations among total mean causal dimensions, total mean affect and recovery outcome variables for all grade II injuries. The variable, total consequences, was simply the subtraction of the positive consequences from the negative consequences for each subject while the total physiotherapist's evaluation score is the negative evaluation value subtracted from the positive evaluation value for each subject.

Table 12 Correlations Among Total Mean Causal Dimensions, Affect and Recovery Outcome Variables for Grade II Injuries

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Total *M* Locus of Causality	1.00														
2. Total *M* Personal Control	.59***	1.00													
3. Total *M* External Control	.04	.14	1.00												
4. Total *M* Stability	.19	-.19	-.22	1.00											
5. Total *M* Negative Affect	-.02	-.04	-.13	.19	1.00										
6. Total *M* Positive Affect	.34*	.20	-.15	.05	.00	1.00									
7. Total *M* Pain Intensity	-.03	-.14	-.22	.12	.33*	-.19	1.00								
8. Recovery Period (days)	.11	.07	.04	.09	-.09	.35**	.00	1.00							
9. Cancellations	.06	.07	-.10	.40**	.08	-.03	.14	.21	1.00						
10. Delay in Seeking Treatment (days)	-.03	-.07	-.07	.02	-.05	.09	-.01	.46***	-.13	1.00					
11. No. of Rehab. Sessions	.10	.03	.15	.00	-.16	.22[a]	-.05	.67***	.08	.05	1.00				
12. Recovery Expectations (days)	.02	.07	.04	.05	-.11	.08	-.10	.46***	.09	.08	.28*	1.00			
13. Perception of Recovery Speed	-.09	-.03	-.03	-.42*	-.14	-.23	.02	-.62***	-.28	-.08	-.37[a]	-.36[a]	1.00		
14. Total Consequences	-.09	-.06	-.09	-.05	.04	.04	.14	.12	-.08	.22	.05	-.03	-.16	1.00	
15. Total Evaluation	-.02	-.06	-.19	.01	-.09	.05	-.22	-.12	-.43***	.06	.07	.00	.35[a]	.02	1.00

[a] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

The total mean variables were based on the same Likert scale used for their single measure counterparts but averaged over the first, mid and final treatment sessions. Perception of recovery speed was measured on a Likert scale from 1 = very slowly to 9 = very quickly. The total consequences of the injury was the subtraction of the positive consequences of the injury from the negative consequences with a high score (a maximum of 8) indicating predominantly negative consequences. The physiotherapist's total evaluation was the subtraction of the negative items from the positive items for each subject with a high score (a maximum of 23) indicating a predominantly positive evaluation.

The variables that significantly correlated with recovery period were the number of rehabilitation sessions, the delay in seeking treatment, recovery expectations and total positive affect. Also positive affect is significantly correlated with locus of causality. An hierarchical regression analysis was employed to test whether differences in expectations for recovery and positive affect measures can be used to predict recovery once differences in the number of rehabilitation sessions and the delay in seeking treatment were statistically eliminated. Therefore, the number of rehabilitation sessions and the delay in seeking treatment were entered first and second respectively into the regression equation. Attribution theory (Weiner, 1985) predicts that locus of control precedes affect and therefore this is entered at step number 3, before positive affect at step 4. Finally, recovery expectations were entered at step 5.

Table 13 displays the unstandardized regression coefficients (*B*) and intercept, the standardised regression coefficients (β), the semipartial correlations (sr^2) and *R*, R^2 and *adjusted* R^2 after entry of all five IVs. *R* was significantly different from zero at the end of each step. After step 5, with all IVs in the equation, $R = .85$, $F(5, 48) = 24.81$, $p < .001$. After step 1 and step 2, with the number of rehabilitation sessions and delay in seeking treatment in the equation, $R^2 = .63$, $F_{inc}(2, 51) = 42.96$, $p < .001$. At step 3, locus of causality did not significantly add to the prediction of recovery period, $R^2 = .63$, $F_{inc}(3, 50) = .44$, $p > .05$. After step 4, with positive affect added to prediction of recovery period, $R^2 = .66$, $F_{inc}(4, 49) = 4.51$, $p < .05$, there is a significant increment in R^2. After step 5, with recovery expectations added to the prediction equation, there is again a significant increment in R^2 with $R^2 = .72$, $F_{inc}(5, 48) = 10.16$, $p < .01$. Apparently, recovery period can be predicted by the positive affect and

recovery expectations beyond differences in the number of rehabilitation sessions and the delay in seeking treatment. However, the predictive ability of the variables of positive affect and recovery expectations is small (9% of the variance) compared to that provided by the number of rehabilitation sessions and the delay in seeking treatment (63% of the variance).

Table 13 Hierarchical Regression of Treatment Sessions, Delay in Seeking Treatment, Locus of Causality, Recovery Expectations and Positive Affect on Recovery Period

Variables	*B*	β	sr^2 (incremental)	*F* Change	Significant *F* Change
Treatment Sessions	3.77	.54			
Delay in Seeking Treatment	1.03	.39	.63	42.96	.00
Total *M* Locus of Control	.00	8.55	.00	.44	.51
Total *M* Positive Affect	1.12	.21	.17	4.51	.04
Recovery Expectations	.62	.25	.06	10.16	.00
Intercept = -35.87					$R^2 = .72$
					Adjusted $R^2 = .69$
					$R = .85$***

***$p < .001$

The lack of supporting results for the hypothesised relationship between attributions and affect, particularly negative affect and recovery outcomes suggests that the variable positive affect may be measuring something besides simply the magnitude of the emotional response to injury. For example, an inspection of some of the items of

the positive affect scale of the PANAS (e.g., strong, determined, enthusiastic) suggests that perhaps it is measuring the direction of affect or motivation towards rehabilitation. To explore this possibility the 10 mean total positive affects were submitted to a principal-axis factor analysis in SPSS to determine if a common factor structure existed. Three factors with eigen values greater than 1.0 emerged. However, two of the items (enthusiastic and determined) comprising two of the factors had cross loadings with each other that were greater than .45 making it difficult to interpret their contribution to these factors. As a result, only those items loading greater than .45 and with no cross loading on the other factors were retained for analysis.

Table 14 Factor Loadings, Communalities and Percents of Variance for Principal Factors Extraction and Varimax Rotation for Total Mean Positive Affect Items

Item	Factor 1	Factor 2	Factor 3	Communalities
Attentive	.82	.00	.00	.73
Strong	.77	.00	.00	.71
Active	.74	.00	.00	.59
Alert	.62	.00	.00	.53
Interested	.00	.00	.91	.83
Excited	.00	.77	.00	.65
Proud	.00	.90	.00	.84
Inspire	.00	.78	.00	.67
Percent of Variance	40.4	14.2	11.5	

Loadings of items on factors, communalities and percents of variance are shown in Table 14. Loadings under .45 (20% of variance) are replaced by zeros. Two of the items in Factor 1, strong and active, seem to be synonymous with recovery. It is

somewhat difficult to label factor 1 as motivation to rehabilitate, especially without the items of "determined" and "enthusiastic". However, the factor loadings of factor 1 do bring into question the suitability of the items of the PANAS positive affect scale to measure positive affect during rehabilitation.

Different processes may be operating when the recovery outcome variable of cancellations is considered because cancellations were only significantly correlated with total mean stability. Unexpectedly, the number of cancellations were not significantly correlated with recovery period for grade II injuries, $r = .21, p > .05$. However, when both grade I and grade II injuries were considered, there was a low but significant correlation of cancellations with recovery, $r=.28, p <.05$. That is, the number of cancellations increased as the recovery period increased. An hierarchical multiple regression analysis was employed to determine if total mean stability for the causes of injury and rehabilitation throughout treatment predicted cancellations beyond differences in recovery period. Therefore, at step 1, recovery period was entered into the regression equation, $R^2 = .08, F_{inc}(1, 70) = 5.73, p < .05$. At step 2, with the total mean stability added to the prediction of cancellations, $R^2 = .18, F_{inc}(2, 69) = 8.51, p < .01$. Addition of total mean stability to the equation results in a significant increment in R^2 beyond that provided by recovery period. After step 3 and 4, with the total mean negative and positive affect added to the prediction of cancellations, $R^2 = .19, F_{inc}(4, 67) = .48, p > .05$.

Table 15 Hierarchical Regression of Recovery Period and Total Mean Stability on Number of Cancellations

Variables	*B*	β	sr^2 (incremental)	*F* Change	Significant *F* Change
Recovery Period	.01	.23	.08	5.72	.02
Total *M* Stability	.08	.32	.10	8.51	.00
Total *M* Negative Affect	.01	.06			
Total *M* Positive Affect	-.02	-.10	.01	.48	.61
intercept = -.34					$R^2 = .19$
					Adjusted $R^2 = .14$
					$R = .43$**

**$p < .01$

Table 15 displays the unstandardized regression coefficients (*B*) and intercept, the standardised regression coefficients (β), the semipartial correlations (sr^2) and *R*, R^2 and *adjusted* R^2 after entry of recovery period, total mean stability and total mean negative and positive affects. *R* was significantly different from zero at the end of each step. After step 4, with all IVs in the equation, $R = .43$, $F(4, 67) = 3.90$, $p < .01$.

The number of cancellations were also significantly correlated with the total evaluation by the physiotherapists of the subjects, $r = -.43$, $p < .001$ (see Table 12). A closer examination of the correlations between cancellations and the individual items of the "Physiotherapist Evaluation of Subject" questionnaire suggested that item 7, "Didn't turn up for appointments" may be contributing to this result, $r = .47$, $p < .05$.

Finally, Table 12 shows no significant correlations between the total consequences of the injury and the other variables. However, an inspection of the individual variables that may be related to the consequences of the injury at that point in time, that is, at the first rehabilitation treatment, indicated that negative consequences were moderately correlated to negative affect, $r = .36, p < .01$. The transformed positive consequences[6] were not quite significant at $p > .05$ ($r = -.26, p = .06$). No other correlations were significant, $p > .05$. This result confirms the importance of examining processes at specific times in rehabilitation rather than variables based on total values across time.

[6] Untransformed positive consequences were significantly correlated with negative affect, $r = .34, p < .05$. However, because of the discrepancy with the transformed positive consequences, the latter were reported here.

Discussion

The results are discussed in a number of sections. Firstly, an overview of the major findings are presented. Secondly, each of these findings is discussed in detail with reference to the literature. Thirdly, the limitations of the study are presented and some suggestions for further research are considered. Finally, recommendations for the enhancement of recovery from injuries are provided.

Overview of Major Findings

Each of the following major findings is with respect to the Statement of Objectives section in the Introduction, that is, point (1) here corresponds to point (1) in the Statement of Objectives.

(1) Subjects were most likely to attribute the causes of their injury to mechanical/technical factors with little emphasis placed on psychological factors. However, if subjects were encouraged to explore further for the causes of injury then psychological factors gained in importance. In contrast, subjects attributed the causes of rehabilitation to physiotherapy, rest and exercise in that order.

(2) None of the attributional dimensions throughout rehabilitation differentiated between subjects with different severity of injuries or speed of recoveries. Perhaps, more surprising, was that there were no changes in attributional dimensions over the period of the rehabilitation and therefore the attributional

dimensions were fairly consistent across time, irrespective of group membership.

(3) There appeared to be no major differences in the positive affect, negative affect and pain intensity experienced between subjects with minor or moderately severe injuries. Similarly, the result was the same for fast and slow healers with the exception that fast healers showed a little more negative affect on their last treatment session. Both negative affect and pain intensity decreased as rehabilitation progressed to the final treatment but positive affect remained unchanged.

(4) The subjects perceived rehabilitation increased as recovery progressed but neither the severity of the injury nor the speed of healing affected these perceptions. That is, subjects started rehabilitation treatment at around 40% recovered and terminated treatment at around 80% recovered, irrespective of their actual recovery time.

(5) Subjects with more severe injuries expected to recover more slowly than those with less severe injuries but more importantly, subjects who recovered faster actually expected to recover faster before treatment and rehabilitation had commenced. Even by the end of treatment this difference was maintained with fast healers perceiving a faster recovery than slow healers. Subjects with moderately severe injuries underestimated their actual recovery time by almost 50%. That is, subjects with grade II injuries took on average about 44 days to

recover when they expected it to take 23 days. Subjects who recovered faster had expectations for recovery that matched their actual recovery times but slow healers underestimated their actual recovery by an average of 64%.

The perceived consequences of the injury did not mediate recovery outcomes but the negative consequences of the injury were directly related to the negative affect experienced at the first treatment session.

(6) There appeared to be few relationships between attributional measures, affective measures and recovery outcomes. Subjects who perceived a greater internal locus of causality reported greater positive affect but only overall positive affect and recovery expectations predicted recovery beyond differences in the number of rehabilitation sessions and the delay in seeking treatment. In contrast, when the number of cancellations was the outcome variable, overall perceived stability for the causes of injury and rehabilitation predicted the number of cancellations irrespective of the length of the recovery period.

Causal Ascriptions for Injury and Rehabilitation

This has been one of the few studies to the author's knowledge examining reasons for injury. The majority of subjects perceived technical/mechanical factors (41%) as the major cause of the injury with psychological factors playing a relatively unimportant role (7%). Kerr & Minden (1988) in post-injury interviews of elite female gymnasts found 12% of their injuries were attributed to a lack of concentration and 90% to

fatigue. Nideffer (1989), without empirical data to support his assertions, believes some 25% of injuries in elite level high risk sports (e.g., diving & gymnastics) may be due to psychological factors such as lapses in concentration. Given that this study was not examining elite athletes but predominantly military college recruits, then the percentage attributed to psychological factors seems realistic.

About 80% of the subjects attributed the causes of their rehabilitation to physiotherapy, rest and exercise. Only one study has provided data to a similar question. Grove, Hanrahan, & Stewart (1990) found that students who imagined reasons for fast and slow recovery attributed 61% and 57% respectively to personal factors that included psychological, physiological and behavioural factors, in descending order of importance. The present experiment does not support the emphasis placed on psychological factors in recovery found in the Grove et al. experiment. The causal ascriptions for rehabilitation may be predominantly determined by contextual and situational factors. The present experiment was conducted in a physiotherapy centre and therefore factors related to this environment heavily influence causal ascriptions for rehabilitation. Alternatively, the Grove et al. experiment was conducted in a classroom where personal factors seemed more important and relevant to recovery. It would have been interesting to compare people's attributions for rehabilitation who did attend the physiotherapy clinic with those who didn't attend the physiotherapy clinic. This point will be returned to in the discussion on the limitations of this study.

The Role of Attributional Dimensions During Rehabilitation

The attributional dimensions of locus of causality, personal control, external control and stability appeared to be relatively consistent throughout rehabilitation. Attributional dimensions were similar for both the causes of injury and rehabilitation and weren't influenced by the severity of the injury nor the speed of healing. For both causes and all grades of injuries, attributions were moderately personally controllable (M = 15.95, SD = 5.60), not controlled by others (M = 11.74, SD = 4.5), fairly unstable (M = 12.28, SD = 4.45) and somewhat low on the locus of causality dimension (M = 13.61, SD = 4.91). This pattern of dimensions suggests that injuries may be able to be avoided to some extent and rehabilitation enhanced with appropriate training or education. Nevertheless, this attributional pattern was not strong especially when the results were compared to the literature in other health behaviour domains. For example, McAuley (1991) found means for locus of causality of 20.98 (SD = 4.20), for stability of 17.23 (SD = 4.85), for personal control of 20.95 (SD = 5.68) and for external control of 10.06 (SD = 5.42) for subjects' reasons for progress during an exercise program. The corresponding attributional measures in this study were noticeably lower with the values congregating around the mid-values on the Revised Causal Dimension Scale, suggesting that subjects might be unsure about how to classify the causes of their injuries and rehabilitation.

However, there were two findings more important than simply the magnitude of the dimensions. Firstly, attributional dimensions were not only the same for the causes of injuries and rehabilitation but didn't appear to change as rehabilitation progressed. This pattern lends support to the construct of attributional styles/traits or the tendency

to make specific attributions across different situations and time. A reasonable body of evidence in social psychology, mainly by Seligman and his associates (e.g., Abramson, Seligman, & Teasdale, 1978; Alloy, Peterson, Abramson, & Seligman, 1984; Seligman, 1990) and some support in exercise and sport psychology (e.g., Hanrahan et al., 1989; Prapavessi, & Carron, 1988) supports the construct of attributional style. Nevertheless, other researchers have found little support for such a construct (see Weiner, 1986 for a brief overview).

For example, evidence cited by Weiner (1986, p.221) indicates that "attributions for failure in achievement settings do not relate to attributions for rejection in affiliative contexts" (Cutrona, Russell, & Jones, 1985). The possibility exists that attributions within a particular context, such as health contexts or even more specifically injury contexts, have greater intra-situational consistency. Indirect support for this is provided by Hanrahan & Grove (1990). They found modest correlations in the development of the Sport Attributional Style Scale (SASS) with the more general Attributional Style Questionnaire (ASQ) which suggested that it measured similar areas to the ASQ but also more sport specific areas. If this wasn't the case, the correlations between the two would have been higher. Research examining the intra-situational consistency of attributional dimensions within health contexts, particularly injury contexts, could be examined by measuring injured subjects on both the CDS II and the SASS. Ideally the SASS would be administered before subjects got injured.

The second major finding on the role of attributional dimensions during rehabilitation was that the attributional pattern appeared to be relatively consistent throughout

rehabilitation despite differences in the severity of injuries or recovery rates of subjects. Two related explanations are possible: (1) attributional dimensions do not play a role in rehabilitation, especially for minor to moderate injuries and (2) attributional dimensions may be important but people need to have attributional re-training for them to be effective in injury rehabilitation.

Weiner (1986), in a review of some 20 studies examining spontaneous attributional search, concluded that it was most promoted under the following conditions: (1) an unexpected event, (2) nonattainment rather than attainment of a goal and possibly (3) important outcomes. It is possible that minor and moderate injuries do not sufficiently satisfy these conditions and it is only under more extreme conditions (e.g., knee reconstructions, recovery from medical operations) that a causal search would be initiated and attributional dimensions would play a role. However, this experiment included two manipulations that would tend to discount this explanation. Firstly, subjects were asked to indicate their expectations for recovery. Slow healers took much longer to recover than they expected, certainly an unexpected outcome and yet there were no significant differences between slow and fast healers on the attributional dimensions. Secondly, subjects were asked to indicate the importance of the consequences of the injury. A very large majority of the subjects emphasised that the negative consequences of the injury were more important than the positive consequences. It would seem that the subjects were motivated to get better and hence a causal search for the factors contributing to recovery would have been likely.

Attributional dimensions may not have played an important role in determining recovery in this experiment but still may play a role if it can be shown that attributional therapy or attribution retraining enhances recovery beyond that found in the present study. Weiner (1986) suggests that attribution retraining could follow three approaches. Applied to recovery from injury, people should attribute poor recovery to either a lack of effort during rehabilitation or to poor rehabilitation procedures and away from factors which are beyond their personal control. This is the learned helplessness model. The second approach is Bandura's self-efficacy model which suggests similar attributions for poor recovery but that motivation or perseverance to rehabilitation is mediated by self-efficacy. Weiner's approach suggests that attributions for poor recovery to a lack of effort or incorrect procedures are also mediated by emotions, especially guilt. It is hypothesised that feelings of guilt renew motivation but feelings of incompetence or humiliation that result from ascriptions to poor ability (e.g., "that's the way I am") impede motivation. Whilst these three theoretical perspectives are different, the practical applications are similar. People should be discouraged from attributing poor recovery to low ability (e.g., genetics), bad luck and external hindrances (e.g., job commitments).

It must be remember that in this study 80% of subjects attributed their recovery to physiotherapy, rest and exercise. In fact, these causal ascriptions are functional and appropriate to rehabilitation. Perhaps, attributional dimensions didn't play a role during rehabilitation in this study because the subjects that persevered with the treatment, whether they were fast or slow healers or had grade I or grade II injuries, all made the same kinds of causal ascriptions, which resulted in similar attributional

dimensions. By collecting data in a physiotherapy centre, subjects were almost preselected on their causal ascriptions to injury and therefore matched on their attributional dimensions. Differences in recovery between fast and slow healers were therefore due to factors beyond simply attributional dimensions.

The Role of Affect Processes During Rehabilitation

Negative affect and pain intensity decreased throughout rehabilitation but positive affect remained constant. It was expected that those who recovered more slowly or had more severe injuries would show more negative affect and report greater pain. This was not supported.

Firstly, why did negative affect and pain intensity decrease but positive affect remain unchanged? The differential results for negative and positive affect confirm the two-factor structure of mood (Watson & Tellegen, 1985) that has been incorporated into the development of the PANAS (Watson & Tellegen, 1988). Watson & Tellegen (1985, p. 221) state that, "Although the terms Positive Affect and Negative Affect might suggest to some readers that these mood factors are opposites (i.e., negatively correlated), they are in fact independent, uncorrelated dimensions...". This is confirmed by the present research, with subjects at the beginning of rehabilitation reporting moderate negative affect, that is, they were moderately distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery and afraid. As rehabilitation progressed, negative affect decreased, that is, subjects became more calm and relaxed. This is because the low end of the PANAS factors reflects the absence of affect. In contrast, the low end of the positive affect scale is described by the adjectives dull and

sluggish. Subjects remained moderately interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive and active throughout treatment.

Interestingly, subjects with moderately severe injuries or who recovered more slowly didn't experience more negative affect than subjects with less severe injuries or who recovered faster. The author is not aware of any research that has made between group comparisons on affect processes during injury. The grief, stress and interactional model of stress and athletic injury all predict differences in affect between these groups. If injury is viewed as a stressor, then the objective injury situation[7] (OIS) of a grade II injury or of slow healing appears to be stressful. Of course, what is more important is how subjects appraised this situation or the subjective injury situation (SIS). The OIS was defined by the physiotherapists for grade of injury and retrospectively for the healing speed based on subjects' length of recovery. Despite differences in the OIS, subjects may have appraised the SIS as similar, irrespective of group membership. The stress models predict that with similar SIS appraisals there would be similar affective reactions. Therefore, perhaps subjects in this study made similar SIS appraisals resulting in the same affect processes across the different groups.

The previous discussion on the role of attributional dimensions provides further support, that indeed , subjects between the experimental groups may well have made similar SIS appraisals. However, the results for the recovery expectations variable

---

[7] The terms of OIS and SIS are adaptations of the terms used by Martens, Vealey & Burton (1990) to describe the competitive process in sport which is similar to the Spielberger (1966) model of anxiety.

suggests that different appraisals of some form may have been occurring. Subjects who had the more severe grade II injuries or were slow recoverers expected to recover slower than their counterparts. In other words, from their SIS appraisals, they expected to recover slower. Presumably, their expectations for recovery were based on a variety of information sources that would have included the severity of the injury.

Perceived Rehabilitation Vs Actual Rehabilitation

The results of this experiment indicated that by the time subjects started rehabilitation treatment they were already around 30 to 40% recovered and terminated treatment at around 80% recovered, irrespective of their actual recovery time or the severity of the injury. Only three studies have provided some information for these processes. Ievleva & Orlick (1991) selected subjects for their Sports Injury Survey assessing psychological factors in rehabilitation based on the concurrence of self-report measures and physiotherapist's assessment that recovery was at 85-90% level of function. McDonald and Hardy (1990) used a similar perceived rehabilitation measure as in this experiment. They administered the measure eight times throughout the first 4 weeks following injury to 5 athletes. At the first assessment (24 hrs postinjury) the subjects had a mean perceived rehabilitation of 11%. By the eighth assessment, which was one week beyond the projected rehabilitation period, the subjects had a mean perceived rehabilitation of 73%. Crossman et al. (1990) using a 9-point Likert scale methodology, found that higher level athletes (those participating at a provincial, national or international level) underestimated the disruptive impact and the short term effects of the injury compared to medical professionals.

The results of this experiment essentially agree with the studies of Ievleva and Orlick (1991) and McDonald and Hardy (1990). There is some discrepancy with McDonald and Hardy on the perceived rehabilitation at the first treatment. However, their first assessment occurred at 24 hours while the first assessment in the present experiment occurred between 5 and 12 days after a grade II injury. For a similar period of time postinjury, McDonald and Hardy's subjects were between 21% (at 4.2 days) and 56 % (at 10.6 days) perceived recovered, which was slightly higher than for the present experiment but then their subjects had of course begun treatment much earlier.

The Crossman et al. result (1990) is interesting as it indirectly implies that their subjects perceived greater rehabilitation than the medical professionals. This was not specifically studied in the present study but it was difficult to get subjects to fill out the *Final Injury Evaluation* questionnaire since they often didn't return for their final treatments. For the purposes of the present experiment, the data from the *Weekly Injury Evaluation* was used as the final data in these cases. It appears that subjects appraise the situation and when they believe they are around 80% recovered, they will terminate rehabilitation. However, the physiotherapists believe further treatment is still required. From their perspective about 90% is a more suitable level of rehabilitation. Nevertheless, the possibility exists that the subject largely determines when termination of treatment occurs and this is earlier than when the physiotherapist might suggest. Further research is needed in this area.

One of the advantages of measuring a subject's perceived rehabilitation is that it enabled a validity check that subjects who actually recovered faster did in fact recover to the same level of those who recovered more slowly. A similar validity check occurred with severity of injury. In both cases the present experiment ruled out the alternative hypothesis that fast healers or subjects with less severe injuries recovered quicker because they perceived greater recovery and therefore terminated treatment earlier.

The Role of Expectancy Beliefs and Consequences of Injury in Rehabilitation

One of the strongest results in the present study was the finding that subjects who expected to recover faster at the beginning of treatment did indeed recover faster and that they thought they had recovered faster by the final treatment. Fast healers appeared to be accurate in their expectations for recovery as their expectations closely matched their actual recovery times. Slow healers grossly underestimated their recovery by 65%. Similarly, as the injury became more severe, as in grade II injuries, subjects' expectations underestimated recovery by nearly 50%.

There are two explanations for this result. Firstly, subjects who expected to recover faster were more motivated to recover faster and this was translated into behavioural actions such as trying harder during rehabilitation, cooperating with the physiotherapist etc. Unfortunately, the physiotherapist evaluations failed to confirm this possible relationship. However, there was a small but significant positive correlation with the number of rehabilitation sessions that provided some support that

behavioural actions increased with the expectation of a faster recovery. However, recovery expectations predicted recovery beyond that provided by the number of rehabilitation sessions suggesting that other behavioural factors may be important (see the next section). Certainly, the literature supports the premise that expectations of future success determines behavioural intentions (Fishbone & Ajzen, 1975; cited in Weiner, 1986).

This argument helps to answer the question why fast healers expected to recover faster but not why subjects with grade II injuries underestimated their actual rehabilitation so dramatically. The Crossman et al. (1990) study offers some answers. Apparently, unlike the higher level athletes referred to earlier, athletes participating at lower levels of competition and those who had not previously experienced a serious injury overestimated the short-term and disruptive effects of an injury in comparison to the corresponding ratings of medical professionals. Contrary to the Crossman et al. finding, subjects in the present study may have underestimated the severity of the injury because they were less likely to know what to expect with more severe injuries due to less experience with such injuries. It is not clear on what information recovery expectations are based but presumably it would include such sources as previous experience with injury.

Another source of information that may influence not only recovery expectations but recovery itself is the perceived consequences of the injury. It was hypothesised that subjects who perceived negative consequences for the injury (e.g., missing out on an important game) that outweighed the positive consequences (e.g., avoiding hard

training) would be encouraged to recover quicker. Contrary to expectations and an extensive clinical literature (e.g., Kanfer & Schefft, 1988; Walen, DiGiuseppe & Wessler, 1980) this was not supported. This was largely due to the homogenous subject characteristics, all military recruits, which resulted in them scoring very high on negative consequences ($M = 8.2$) and very low on positive consequences ($M = 2.5$). Apparently, as a whole, the recruits were highly motivated to recover with few secondary gain issues that may have encouraged them to prolong rehabilitation. The military subculture in which they lived, worked and played not only inculcated these beliefs but pressured them to conform to them, so much so, that some of the subjects reported that their injuries got worse because of inappropriate activity and insufficient recovery time allowance.

The stress model of injury (Figure 1 - Introduction) predicts that the consequences of an injury are based on the emotional responses to the injury. Support for this proposition is provided by the modest positive correlation between negative affect and the negative consequences. Of course, the directional aspect of the model, that negative affect causes negative consequences, was unable to be verified as both were measured at the same time. In all likelihood, it will be difficult to identify cause and effect as both variables (and other variables) contribute to each other.

There was a minor confound in measuring the positive consequences of an injury as it was possible to have positive consequences that were functional for recovery. For example, "learning how to strap an ankle" enabled the subject to protect the ankle which may have helped in recovery. Fortunately, very few subjects interpreted the

meaning of positive consequences this way and with the few that did, it was possible to rescore the positive consequences as negative, in conjunction with the theoretical framework proposed in the study.

The Relationship between Attributions, Affect and Recovery Outcomes

The hypothesised relationships between attributions, affect and recovery outcomes were partly supported. The main predictors of recovery were the number of rehabilitation sessions and the delay in seeking treatment. However, subjects who experienced greater positive affect and had expectations for a faster recovery predicted recovery beyond simply these behavioural variables. The attributional dimension of locus of causality, while directly related to the total positive affect experienced by the subject, did not add to the prediction of recovery. That is, subjects who perceived greater locus of causality (the cause of rehabilitation was more internalised) were more positive, as predicted by attribution theory. However, this link disappeared in the prediction of recovery.

In contrast, the attributional dimension of total perceived stability of the causes of injury and rehabilitation predicted the number of cancellations beyond that simply due to a longer recovery period. Interestingly, subjects who thought that they had a slow recovery made stable attributions for the causes of their rehabilitation and expected it

to take a longer period of time[8]. The hypothesised relationship between the stability dimension and affect was not present.

Weiner (1986, p.114) believes that "the amount, extensity, and consistency of the empirical findings documents a fundamental psychological law relating perceived causal stability to expectancy change: Changes in expectancy of success following an outcome are influenced by the perceived stability of the cause of the event". Applied to the present experiment: subjects who saw their rehabilitation as progressing poorly and attributed it to a stable cause were likely to feel hopeless about the outcome and expect this to continue in the future. Under such circumstances, it would be expected that subjects would miss rehabilitation sessions, as was the case in the present experiment.

The results of the present study are inconsistent with those of the Grove et al. (1990) study which asked students to vividly imagine recovering slowly or quickly from a serious injury. Their subjects perceived the causes of slow recovery to be more internalised and less stable over time. However, Grove et al. (1990, p.112) state that the "differences in locus of causality were not as consistent nor as large as differences on the other dimensions". Perhaps subjects who recovered slower in the present experiment were not accepting blame for their poor recovery and it served some ego protecting function. With regard to the stability dimension, the author agrees with Grove et al. that functional attributions for slow recovery should focus on the less

---

[8] The latter finding between perception of recovery speed and recovery expectations only approached significance, $r = -.36$, $p = .059$ (see Table 12).

stable causes. However, this is not what actually occurred during rehabilitation. Poor recovery was attributed to more stable causes leading to more cancellations.

The present study found no support for the roles of personal control and the external control attribution dimension during rehabilitation. It does appear that the locus of causality dimension is related to the personal control dimension but the results found only very low non significant relationships between personal and external control on their total mean scores (from Table 12). Certainly, personal control was strongly implicated in the Grove et al. study, with the causes of slow recovery tending to be perceived as less controllable. The present results on the controllability dimensions are difficult to explain except with reference to the previous discussion that situational and contextual factors of the physiotherapy centre provided similar appraisals and hence attributions. Part of the reason may also be due to using behavioural variables as outcome variables.

The present study had difficulty in verifying the hypothesised links between attributional dimensions and affect in the prediction of recovery outcome variables, in particular recovery time and cancellations. It was reported in the Introduction that in prospective designs only 10 -15% of the variance is accounted for in relationships between negative life events and self-report measures and this decreases to 5% when objective health measures are used (Smith, Smoll, & Ptacek, 1990). This reduction in variance for prospective designs and objective health measures may at least partly explain the "dropping out" of hypothesised links in the regression analyses.

Limitations of the Study and Future Research

Some limitations of the study were discussed in the preceding sections. These limitations will be further developed and discussed in relation to future research.

The main limitation of the present study was the assessment of attributions for recovery in a physiotherapy centre which, as already discussed, may have inadvertently had the effect of preselecting subjects on their causal ascriptions to injury and therefore matching subjects on their attributional dimensions. Causal ascriptions for injury rehabilitation were quite restricted and therefore the goal of future research would be to assess a greater variety. This would necessitate measuring attributions earlier in the rehabilitation process, for example, at a doctor's surgery. This would help to answer the question of how attributional and affective processes of injured people are different for those who attend a physiotherapy centre from those who don't

The question is more complex than this because for many health behaviours some people seek treatment and others don't seek treatment. What is the relationship between health behaviours? Very few studies have been specifically designed to investigate this question but some limited evidence suggests that, for example, regular exercisors are more likely to visit a physician for a preventative examination, practice preventative dentistry and wear a seat belt (Blair, 1988). The theoretical framework proposed in this paper may prove a useful starting point for this investigation.

Causal ascriptions for rehabilitation and the resultant attributions and affects should not only be measured in different settings but also at different times, at higher levels of sport and for greater severity of injuries. The latter variables have already been discussed but the delay in seeking treatment requires further consideration. The delay in seeking treatment appears to be an important behavioural component in determining rehabilitation and yet this interval was quite variable in the present study. Assessing the perceived causes for rehabilitation rather than causes of injury at this point in time may be related to attributional and affective processes. There didn't appear to be any relationship in the present study but the wrong attributional question may have been asked.

The attrition of subjects from the study was a source of concern. Exploratory analyses suggested that subjects who persevered with treatment were similar on attributional and affect variables to those who dropped out. However, given the finding that subjects who perceived the causes of poor rehabilitation as being relatively stable tended to make more cancellations, then this finding may be more pronounced among those who dropped out. This was confirmed by McAuley, Poag, Gleason and Wraith (1990) who measured the reasons for attrition from past exercise programs from subjects enrolling in a new program. Subjects perceived the causes of their attrition to be stable and uncontrollable and this was associated with greater feelings of frustration. Clinical records from a physiotherapy clinic or other health setting (e.g., chiropractic clinic) would provide a sample of subjects that have both moderately severe injuries and low treatment attendance which could be assessed retrospectively

on their causal ascriptions, attributions and affect for dropping out of treatment. Such a study might replicate the findings in other health domains.

The assessment of affect during rehabilitation, especially to test the relationships between attributions and affect, is problematical. Early research in the achievement areas (Covington & Omelich, 1984) and the exercise health areas (McAuley et al., 1983, 1990; McAuley & Duncan, 1989) attempted to measure Weiner's et al. (1979) hypothesised links between attributions and specific affects such as anger, upset, guilt etc (see Introduction - Figure 2). More recent research, in the exercise health areas (McAuley, 1991), has supported the common factor structure of these affects and the distinction between positive and negative affect factors. This latter research influenced the direction of the present study in utilising the PANAS. Unfortunately, it doesn't enable the testing of the hypothesised relationships between attributions and specific affects and nor is it entirely appropriate for measuring affect during rehabilitation.

The exploratory factor analysis in the present study provided some limited support for the concept that the Positive Affect scale of the PANAS may be measuring a factor that denotes the direction of behaviour (e.g., motivation) rather than the intensity of affect. Such a proposition is not unusual as state anxiety has been conceptualised as having both an intensity and a directional component (Martens, 1977). Furthermore, the factor analysis results questioned the suitability of some of the items of the PANAS to actually measure positive affect during rehabilitation. Even the subjects themselves stated that some of the items were not relevant in describing their pain.

Fortunately, a considerable amount of work has gone into defining and measuring the dimensions of subjective pain along three distinct dimensions: pain intensity, pain affect and pain location (Jensen & Karoly, 1992). The present study measured pain intensity using a Likert scale similar to the ones advocated by Jensen and Karoly (1992) and pain affect was measured using the PANAS. However, it would have been more appropriate and situation specific to use the Affective subscale of the McGill Pain Questionnaire (Melzak, 1975) or something shorter and similar to the PANAS such as the Descriptor Differential Scale of Pain Affect (Gracely & Kwilosz, 1988; cited in Jensen & Karoly, 1992). Finally, an unresearched question is how might the location of pain vary with not only attributions but also differing recovery expectations by the inclusion of a pain location assessment instrument. It seems reasonable to predict that fast healers might not only perceive the causes of pain as being controllable and less intense but also smaller in location.

The examination of perceptual processes during rehabilitation seems to warrant further research. What sources of information determine recovery expectations and in turn what behavioural variables during treatment are affected by them? Why do clients with moderately severe injuries underestimate their rehabilitation? What is the degree of concurrence between a patient's perceived recovery with that of the physiotherapist or other medical professional? At what percentage of recovery do patients terminate treatment? Is this percentage of recovery in agreement with the treating professional? These questions remain unanswered.

Recommendations for the Enhancement of Recovery

The results of the present study suggest a number of recommendations for medical and allied health professionals in the treatment of injuries.

Firstly, the health professional needs to be cognisant of how patients perceive their situation and appraise their recovery. Patients who are recovering slowly should be encouraged to ascribe the causes of their rehabilitation to unstable and internal attributions such as stretching and strengthening exercises, treatment modalities such as RICE (i.e., rest, ice, compression, elevation), taught strapping procedures and generally encouraged to take make an effort in their treatment. Such patients should also be encouraged to feel positive and hopeful about their treatment success so as to maintain adherence to the treatment regimen.

Medical personnel need to detect clients who are recovering slowly and who tend to perceive the causes of their slow rehabilitation as stable, with signs of high negative affect. Patients who make such attributions might say some of the following:

(1) "I don't have the willpower to do these exercises".

(2) "I always recover slowly from injuries. It's just the way my body is".

(3) "I'd never have the time at work to apply ice to my injury".

(4) "She's not a very good physiotherapist. Unfortunately, I have to see her".

(5) "I'm so weak that I could never do the exercises that you want me to try".

It seems worthwhile for medical personnel to incorporate two simple but effective measures into their practice: recovery expectations and perceived percentage

rehabilitation. Both measures might provide information about how fast the client will recover and when treatment is terminated. Noticeable differences in perceptions between the client and the treating professional are possible early warning signs of poor recovery and premature termination of treatment.

Finally, behavioural factors are very important in recovery. Increasing the number of treatments and reducing the number of cancellations are well established methods to enhance rehabilitation. Patients should also be encouraged to see a physiotherapist or other rehabilitation specialist as soon as possible after an injury or referral by a medical practitioner, thus reducing the delay in seeking regular rehabilitation.

References

Abramson, L. Y., Seligman, M. E. P., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology, 87,* 49-74.

Alloy, L. B., Peterson, C., Abramson, L. Y., & Seligman, M. E. P. (1984). Attributional style and the generality of learned helplessness. *Journal of Personality and Social Psychology, 46(3),* 681-687.

Amirkhan, J. H. (1990). Applying attribution theory to the study of stress and coping. In Sandra Graham and Valerie Folkes (Eds.), *Attribution theory: Applications to achievement, mental health, and interpersonal conflict* (pp.79-102). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Andersen, M. B., & Williams, J. M. (1988). A model of stress and athletic injury: Prediction and prevention. *Journal of Sport & Exercise Psychology, 10,* 294-306.

Baumgardner, A. H., Heppner, P. P., & Arkin, R. M. (1986). Role of causal attribution in personal problem solving. *Journal of Personality and Social Psychology, 50(3),* 636-643.

Beck, A. T. (1976). *Cognitive therapy and the emotional disorders.* New York: International Universities Press.

Blair, S. N. (1988). Exercise within a healthy lifestyle. In Rod K. Dishman (Ed.), *Exercise adherence: Its impact on public health.* Champaign, IL: Human Kinetics.

Campbell, A., Converse, P. E., & Rogers, W. L. (1976). *The quality of American life: Perceptions, evaluations, and satisfactions.* New York: Sage.

Crossman, J., Jamieson, J., & Hume, M. (1990). Perceptions of athletic injuries by athletes, coaches and medical professionals. *Perceptual and Motor Skills, 71,* 848-850.

Covington, M. V., & Omelich, C. L. (1984). An empirical examination of Weiner's critique of attributional research. *Journal of Educational Psychology, 76,* 1214-1225.

Cutrona, C. E., Russell, D., & Jones, R. D. (1985). Cross-situational consistency in causal attributions: Does attributional style exist? *Journal of Personality and Social Psychology, 47,* 1043-1058.

Duncan, T., & McAuley, E. (1987). Efficacy expectations and perceptions of causality in motor performance. *Journal of Sport and Exercise Psychology, 9,* 385-393.

Ellis, A., & Harper, R. A. (1975). *A new guide to rational living*. Englewood Cliffs, NJ: Prentice-Hall.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Follette, V. M., & Jacobson, N. S. (1987). Importance of attributions as a predictor of how people cope with failure. *Journal of Personality and Social Psychology, 52(6)*, 1205-1211.

Forsterling, F. (1988). *Attribution theory in clinical psychology*. Chichester, Sussex: Wiley.

Gordon, S. (1988). Sport psychology and the injured athlete: A cognitive-behavioural approach to injury response and injury rehabilitation. *The Journal of the Canadian Athletic Therapists' Association, Fall*, 4-6.

Gordon, S., Milios, D., & Grove, J. R. (1991). Psychological aspects of the recovery process from sport injury: The perspective of sport physiotherapists. *The Australian Journal of Science and Medicine in Sport, 23(2)*, 53-60.

Grove, J. R., Hanarahan, S. J., & Stewart, M. L. (1990). Attributions for rapid or slow recovery from sports injuries. *Canadian Journal of Sport Science, 15(2)*, 107-114.

Gracely, R. H., & Kwilosz, D .M. (1988). The Descriptor Differential Scale: Applying psychophysical principles to clinical pain assessment. *Pain, 35*, 279-288.

Hanrahan, S. J. (1990). Further examination of the psychometric properties of the Sport Attributional Style Scale. *Journal of Sport Behavior, 13(4)*, 183-193.

Hanrahan, S. J., Grove, R., & Hattie, J. A. (1989). Development of a questionnaire measure of sport-related attributional style. *International Journal of Sport Psychology, 20*, 114-134.

Hanrahan, S. J., & Grove, J. R. (1990). Further examination of the psychometric properties of the Sport Attributional Style Scale. *Journal of Sport Behavior, 13(4)*, 183-193.

Ievleva, L., & Orlick, T. (1991). Mental links to enhanced healing: An exploratory study. *The Sport Psychologist, 5*, 25-40.

Jensen, M. P., & Karoly, P. (1992). Self-report scales and procedures for assessing pain in adults. In D. C. Turk and R. Melzack (Eds.), *Handbook of pain assessment*. New York: Guilford Press.

Kanfer, F. H., & Schefft, B. K. (1988). *Guiding the process of therapeutic change.* Champaign, IL: Research Press.

Kelley, M. J. (1990). Psychological risk factors and sports injuries. *The Journal of Sports Medicine and Physical Fitness, 30(2),* 202-221.

Kerr, G., & Minden, H. (1988). Psychological factors related to the occurrence of athletic injuries. *Journal of Sport & Exercise Psychology, 10(2),* 167-173.

Malouff, J. M., & Schutte, N. S. (1986). Development and validation of a measure of irrational belief. *Journal of Consulting and Clinical Psychology, 54(6),* 860-862.

Martens, R. (1977). *Sport competition anxiety test.* Champaign, IL: Human Kinetics.

Martens, R., Vealey, R. S., & Burton, D. (1990). *Competitive anxiety in sport.* Champaign, IL: Human Kinetics.

McAuley, E. (1991). Efficacy, attributional and affective responses to exercise participation. *Journal of Sport and Exercise Psychology, 13,* 382-393.

McAuley, E., & Duncan, T. E. (1989). Causal attributions and affective reactions to disconfirming outcomes in motor performance. *Journal of Exercise and Sport Psychology, 11,* 187-200.

McAuley, E., & Gross, J. B. (1983). Perceptions of causality in sport: An application of the causal dimension scale. *Journal of Sport Psychology, 5,* 72-76.

McAuley, E., Duncan, T. E., & Russell, D. (in press). Measuring causal attributions: The Revised Causal Dimension Scale (CDSII). *Personality and Social Psychology Bulletin.*

McAuley, E., Poag, K., Gleason, A., & Wraith, S. (1990). Attrition from exercise programs: Attributional and affective perspectives. *Journal of Social Behaviour and Personality, 5(6),* 591-602.

McAuley, E., Russell, D., & Gross, J. (1983). Affective consequences of winning and losing: An attributional analysis. *Journal of Sport Psychology, 5,* 278-287.

McDonald, S. A., & Hardy, C. J. (1990). Affective response patterns of the injured athlete: An exploratory analysis. *The Sport Psychologist, 4,* 261-274.

Melzack, R. (1975). The McGill Pain Questionnaire. In R. Melzack (Ed.), *Pain measurement and assessment.* New York: Raven Press.

Nideffer, R. M. (1981). *The ethics and practice of applied sports psychology.* New York, Movement Publications.

Nideffer, R. M. (1989). Psychological aspects of sports injuries: Issues in prevention and treatment. *International Journal of Sport Psychology, 20,* 241-255.

Norusis, M. J. (1993). *SPSS for Windows Base System User's Guide Release 6.0.* Chicago, IL.: SPSS Inc.

Peterson, C. (1990). Explanatory style in the classroom and on the playing field. In Sandra Graham and Valerie Folkes (Eds.), *Attribution theory: Applications to achievement, mental health, and interpersonal conflict* (pp.53-75). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Prapavessi, H., & Carron, A. V. (1988). Learned helplessness in sport. *The Sport Psychologist, 2,* 189-201.

Russell, D. (1982). The causal dimension scale: A measure of how individuals perceive causes. *Journal of Personality and Social Psychology, 42(6),* 1137-1145.

Seligman, M. E. P. (1990). *Learned optimism.* Sydney: Random House.

Seligman, M. E. P., Abramson, L. Y. Semmel, A., & Semmel, A. von Baeyer, C. (1979). Depressive attributional style. *Journal of Abnormal Psychology, 88,* 242-247.

Shontz, F. C. (1975). *The psychological aspects of physical illness and disability.* New York: MacMillan.

Spielberger, C. D. (1966). Theory and research on anxiety. In C. D. Spielberger (Ed.), *Anxiety and behaviour.* New York: Academic Press.

Sport injuries in Australia. A report to the National Better Health Program. Summary. October 1990.

Strickland, B. R. (1989). Internal-external control expectancies: From contingency to creativity. *American Psychologist, 44(1),* 1-12.

Tabachnick, B. G., & Fidell, L. S. (1989). *Using multivariate statistics.* New York: Harper Collins.

Taylor, S. E., Lichtman, R. R., & Wood, J. V. Attributions, beliefs about control, and adjustment to breast cancer. *Journal of Personality and Social Psychology, 46(3),* 489-502.

Walen, S. R., DiGiuseppe, R., & Wessler, R. (1980). *A practitioner's guide to rational-emotive therapy.* New York: Oxford University Press.

Watson, D., Clark, L. A., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin, 98(2),* 219-235.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063-1070.

Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review, 92(4)*, 548-573.

Weiner, B. (1986). *An attributional theory of motivation and emotion.* New York: Springer-Verlag.

Weiner, B., Russell, D., & Lerman, D. (1979). The cognition-emotion process in achievement-related contexts. *Journal of Personality and Social Psychology, 37(7)*, 1211-1220.

Weiss, M. R., & Troxel, R. K. (1986). Psychology of the injured athlete. *Athletic Training, 21(2)*, 104-109, 154.

Wiese, D. M., & Weiss, M. R. (1987). Psychological rehabilitation and physical injury: Implications for the sportsmedicine team. *The Sport Psychologist, 1*, 318-330.

Appendix

THE AUSTRALIAN NATIONAL UNIVERSITY
CONSENT FOR RESEARCH

■ Purpose of Study

The study is examining the psychological side of sports injury and rehabilitation. This will help to increase not only our theoretical understanding but also may help people and athletes recover faster from injuries, and aid in their return to normal physical activities.

■ Name of Investigator

Mr Clinton Laurence, B.H.M.S. (Hon.) Ph (06) 282 2007

■ Methods and Demands

You will be asked to complete three main questionnaires of about 15 minutes each: at the beginning of your ankle injury, mid-way through your rehabilitation, and at the end of your rehabilitation. Each questionnaire is slightly different but will essentially ask questions assessing the causes of your injury or rehabilitation, your reactions to your injury, the consequences of the injury, your expectations for recovery, and how much pain you are experiencing. Finally, once a week during your rehabilitation you will be required to fill out a simple questionnaire assesing your feelings during the past week. This will only require a minute or two of your time. Participation in this study is voluntary and you are free to withdraw at any time.

■ Risks, Inconveniences and Discomforts Which May Occur

The results of this study will be completely confidential and your annonymity to all persons other than the Investigator is assured. There are no risks, inconveniences or discomforts involved with participating in this research.

■ Please Read And Sign Below

I have been asked to participate in the above research study and give my consent by signing this form on the understanding that:

- The research study will be carried out in a manner conforming with the principles set out by the National Health and Medical Research Council.
- The general purposes, methods and demands and the possible risks, inconveniences and discomforts which may occur during the study have been made known.
- Refusal to take part in this study will not affect the treatment of my condition.
- I'm volunteering to take part in this study and I may withdraw at any time.
- This research has been approved by the *Australian National University Research and Human Ethics Review Committees,* and the *Australian Defence Medical Ethics Committee.*
- I have independent access to the *Australian Defence Medical Ethics Committee* to raise any issues relating to this research.

Signature: ..... **Service No.:** ..... **Date:** .....

Address: .....

.....**Ph.:** .....

Initial Injury Evaluation

Service Number:_____ **Rank:** _____ **Date:** _____

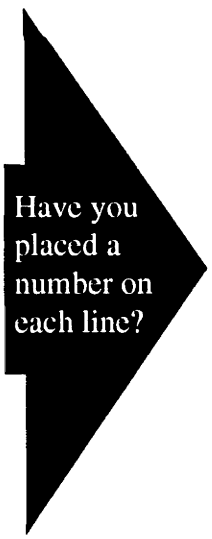
The purpose of this questionnaire is to gain a greater understanding of the causes of injury and rehabilitation from injury, and peoples' reactions during these processes. Please answer the questions as honestly as possible as your contribution will help towards increasing our understanding of injury and rehabilitation processes and may help other people with similar injuries. Remember,your answers are **TOTALLY CONFIDENTIAL** and please **COMPLETE EVERY QUESTION**.

When did you injure your ankle (please write the date)? _____

Your Reactions to the Injury

1. This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way about your injury during the past week. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	**a little**	**moderately**	**quite a bit**	**extremely**



_____	interested	_____	irritable
_____	distressed	_____	alert
_____	excited	_____	ashamed
_____	upset	_____	inspired
_____	strong	_____	nervous
_____	guilty	_____	determined
_____	scared	_____	attentive
_____	hostile	_____	jittery
_____	enthusiastic	_____	active
_____	proud	_____	afraid

2. Please circle the number that best describes the intensity of the pain associated with your injury.

No pain at all 1 2 3 4 5 6 7 8 9 Very severe pain

3. How far along do you think you are with your rehabilitation? On a scale from 0% to 100%, what percent rehabilitation do you think you are right now?

_____ %

The Causes of Your Injury

Please try to vividly imagine yourself in the situation where you seriously injured your ankle. Please describe how this injury occurred.

.....

.....

.....

What do you think caused this injury? What were the factors that contributed to this injury? While events may have many causes, we want you to pick the three most likely causes. There are three spaces below. In the first space write the most likely cause. In the next space, write the second most likely cause. Finally, in the third space write the third most likely cause. In other words order these causes in importance from the most likely cause to the third most likely cause of your injury.

1. Most Likely Cause:.....

2. Second Most Likely Cause: .....

3. Third Most Likely Cause: .....

Think about the reasons you have written above. The items below concern your impressions or opinions for the MOST LIKELY CAUSE of your injury (i.e., number one from above). Circle one number for each of the following questions.

Is the cause something:

1.	*That reflects an aspect of yourself*	9	8	7	6	5	4	3	2	1	*reflects an aspect of the situation*
2.	*Manageable by you*	9	8	7	6	5	4	3	2	1	*not manageable by you*
3.	*Permanent*	9	8	7	6	5	4	3	2	1	*temporary*
4.	*You can regulate*	9	8	7	6	5	4	3	2	1	*you cannot regulate*
5.	*Over which others have control*	9	8	7	6	5	4	3	2	1	*over which others have no control*
6.	*Inside of you*	9	8	7	6	5	4	3	2	1	*outside of you*
7.	*Stable over time*	9	8	7	6	5	4	3	2	1	*variable over time*
8.	*Under the power of other people*	9	8	7	6	5	4	3	2	1	*not under the power of other people*
9.	*Something about you*	9	8	7	6	5	4	3	2	1	*something about others*
10.	*Over which you have power*	9	8	7	6	5	4	3	2	1	*over which you have no power*

11. *Unchangeable*	9	8	7	6	5	4	3	2	1	*changeable*
12. *Other people can regulate*	9	8	7	6	5	4	3	2	1	*other people cannot regulate*

The items below concern your impressions or opinions for the SECOND MOST LIKELY CAUSE of your injury (i.e., cause number 2 from page 2) . Circle one number for each of the following questions.

Is the cause something:

1. *That reflects an aspect of yourself*	9	8	7	6	5	4	3	2	1	*reflects an aspect of the situation*
2. *Manageable by you*	9	8	7	6	5	4	3	2	1	*not manageable by you*
3. *Permanent*	9	8	7	6	5	4	3	2	1	*temporary*
4. *You can regulate*	9	8	7	6	5	4	3	2	1	*you cannot regulate*
5. *Over which others have control*	9	8	7	6	5	4	3	2	1	*over which others have no control*
6. *Inside of you*	9	8	7	6	5	4	3	2	1	*outside of you*
7. *Stable over time*	9	8	7	6	5	4	3	2	1	*variable over time*
8. *Under the power of other people*	9	8	7	6	5	4	3	2	1	*not under the power of other people*
9. *Something about you*	9	8	7	6	5	4	3	2	1	*something about others*
10. *Over which you have power*	9	8	7	6	5	4	3	2	1	*over which you have no power*
11. *Unchangeable*	9	8	7	6	5	4	3	2	1	*changeable*
12. *Other people can regulate*	9	8	7	6	5	4	3	2	1	*other people cannot regulate*

The items below concern your impressions or opinions for the THIRD MOST LIKELY CAUSE of your injury (i.e., cause number 3 from page 2) . Circle one number for each of the following questions.

Is the cause something:

1. *That reflects an aspect of yourself*	9	8	7	6	5	4	3	2	1	*reflects an aspect of the situation*
2. *Manageable by you*	9	8	7	6	5	4	3	2	1	*not manageable by you*
3. *Permanent*	9	8	7	6	5	4	3	2	1	*temporary*
4. *You can regulate*	9	8	7	6	5	4	3	2	1	*you cannot regulate*

5.	*Over which others have control*	9	8	7	6	5	4	3	2	1	*over which others have no control*
6.	*Inside of you*	9	8	7	6	5	4	3	2	1	*outside of you*
7.	*Stable over time*	9	8	7	6	5	4	3	2	1	*variable over time*
8.	*Under the power of other people*	9	8	7	6	5	4	3	2	1	*not under the power of other people*
9.	*Something about you*	9	8	7	6	5	4	3	2	1	*something about others*
10.	*Over which you have power*	9	8	7	6	5	4	3	2	1	*over which you have no power*
11.	*Unchangeable*	9	8	7	6	5	4	3	2	1	*changeable*
12.	*Other people can regulate*	9	8	7	6	5	4	3	2	1	*other people cannot regulate*

The Consequences of your Injury

- What are the **NEGATIVE** consequences of the injury to you? Please describe the most important (e.g., unable to compete in a competition).

.....

.....

Please rate how important these consequences are to you.

Not at all important *1* *2* *3* *4* *5* *6* *7* *8* *9* *Very important*

- What are the **POSITIVE** consequences of the injury to you? Please describe the most important (e.g., avoiding difficult training).

.....

.....

Please rate how important these consequences are to you.

Not at all important *1* *2* *3* *4* *5* *6* *7* *8* *9* *Very important*

Your Expectations for Recovery

How fast do you expect to recover from your injury? Please circle the length of time that best describes your expectations for recovery.

1 week	*2 weeks*	*3 weeks*	*4 weeks*	*6 weeks*	*2 months*	*3 months*	*>4 months*

Weekly Injury Evaluation

Service Number:_____ **Rank:** _____ **Date:** _____

1. This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way about your injury during the past week. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	**a little**	**moderately**	**quite a bit**	**extremely**

Have you placed a number on each line?

_____	interested	_____	irritable
_____	distressed	_____	alert
_____	excited	_____	ashamed
_____	upset	_____	inspired
_____	strong	_____	nervous
_____	guilty	_____	determined
_____	scared	_____	attentive
_____	hostile	_____	jittery
_____	enthusiastic	_____	active
_____	proud	_____	afraid

2. Please circle the number that best describes the intensity of the pain associated with your injury.

No pain at all 1 2 3 4 5 6 7 8 9 Very severe pain

3. How far along do you think you are with your rehabilitation? On a scale from 0% to 100%, what percent rehabilitation do you think you are right now?

_____ %

If you are more than halfway through your rehabilitation and recovery (i.e., over 45% rehabilitated), please answer the questions **over the page** regarding the reasons for your recovery to this point in time.

What do you consider the most important cause for your rehabilitation to date?

_____

_____

Think about the reason you have written above. The items below concern your impressions or opinions for the cause of your rehabilitation to this point in time. Circle one number for each of the following questions.

Is the cause something:

1.	*That reflects an aspect of yourself*	9	8	7	6	5	4	3	2	1	*reflects an aspect of the situation*
2.	*Manageable by you*	9	8	7	6	5	4	3	2	1	*not manageable by you*
3.	*Permanent*	9	8	7	6	5	4	3	2	1	*temporary*
4.	*You can regulate*	9	8	7	6	5	4	3	2	1	*you cannot regulate*
5.	*Over which others have control*	9	8	7	6	5	4	3	2	1	*over which others have no control*
6.	*Inside of you*	9	8	7	6	5	4	3	2	1	*outside of you*
7.	*Stable over time*	9	8	7	6	5	4	3	2	1	*variable over time*
8.	*Under the power of other people*	9	8	7	6	5	4	3	2	1	*not under the power of other people*
9.	*Something about you*	9	8	7	6	5	4	3	2	1	*something about others*
10.	*Over which you have power*	9	8	7	6	5	4	3	2	1	*over which you have no power*
11.	*Unchangeable*	9	8	7	6	5	4	3	2	1	*changeable*
12.	*Other people can regulate*	9	8	7	6	5	4	3	2	1	*other people cannot regulate*

THANK-YOU

Final Injury Evaluation

Service Number:_____ **Rank:** _____ **Date:** _____

1. This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way about your injury during the past week. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	**a little**	**moderately**	**quite a bit**	**extremely**

_____	interested	_____	irritable
_____	distressed	_____	alert
_____	excited	_____	ashamed
_____	upset	_____	inspired
_____	strong	_____	nervous
_____	guilty	_____	determined
_____	scared	_____	attentive
_____	hostile	_____	jittery
_____	enthusiastic	_____	active
_____	proud	_____	afraid

2. Please circle the number that best describes the intensity of the pain associated with your injury.

No pain at all 1 2 3 4 5 6 7 8 9 Very severe pain

3. How far along do you think you are with your rehabilitation? On a scale from 0% to 100%, what percent rehabilitation do you think you are right now?

_____ %

4. How fast did you recover from your injury? Please circle the number that best describes your recovery?

Very slowly 1 2 3 4 5 6 7 8 9 Very quickly

P.T.O.

What do you consider the most important cause for this recovery rate?

_____

_____

Think about the reason you have written above. The items below concern your impressions or opinions for the cause of your rehabilitation to this point in time. Circle one number for each of the following questions.

Is the cause something:

1.	*That reflects an aspect of yourself*	9	8	7	6	5	4	3	2	1	*reflects an aspect of the situation*
2.	*Manageable by you*	9	8	7	6	5	4	3	2	1	*not manageable by you*
3.	*Permanent*	9	8	7	6	5	4	3	2	1	*temporary*
4.	*You can regulate*	9	8	7	6	5	4	3	2	1	*you cannot regulate*
5.	*Over which others have control*	9	8	7	6	5	4	3	2	1	*over which others have no control*
6.	*Inside of you*	9	8	7	6	5	4	3	2	1	*outside of you*
7.	*Stable over time*	9	8	7	6	5	4	3	2	1	*variable over time*
8.	*Under the power of other people*	9	8	7	6	5	4	3	2	1	*not under the power of other people*
9.	*Something about you*	9	8	7	6	5	4	3	2	1	*something about others*
10.	*Over which you have power*	9	8	7	6	5	4	3	2	1	*over which you no have power*
11.	*Unchangeable*	9	8	7	6	5	4	3	2	1	*changeable*
12.	*Other people can regulate*	9	8	7	6	5	4	3	2	1	*other people cannot regulate*

THANK-YOU for the time and effort that you have contributed to this study. Is there anything you would like to say about this study that might be helpful in future research? If so, please indicate:

.....

.....

.....

Do you want information on the results and outcome of the study: ❑ **Yes** ❑ **No**

(please tick whichever is applicable)

Physiotherapist's Evaluation of Subject

(To be completed by the physiotherapist at the end of treatment)

Service Number or Name: _____ **Date:** _____

Please assess each subject's motivation in rehabilitation by circling the appropriate number for each item.

1. The subject worked hard in rehabilitation.

Strongly disagree 1 2 3 4 5 6 7 *Strongly agree*

2. Assumed personal responsibility for rehabilitation.

Strongly disagree 1 2 3 4 5 6 7 *Strongly agree*

3. Provided feedback to therapist about the injury and the rehabilitation program.

Strongly disagree 1 2 3 4 5 6 7 *Strongly agree*

4. Questioned in a cheerful manner on how to assist in rehabilitation.

Strongly disagree 1 2 3 4 5 6 7 *Strongly agree*

5. Complied and cooperated with the therapist.

Strongly disagree 1 2 3 4 5 6 7 *Strongly agree*

6. Didn't follow the rehabilitation program outside physiotherapy.

Strongly disagree 1 2 3 4 5 6 7 *Strongly agree*

7. Didn't turn up for appointments.

Strongly disagree 1 2 3 4 5 6 7 *Strongly agree*

8. Didn't listen attentively.

Strongly disagree 1 2 3 4 5 6 7 *Strongly agree*

9. Denied the extent of the injury.

Strongly disagree 1 2 3 4 5 6 7 *Strongly agree*

10. Didn't accommodate the injury by making changes in lifestyle.

Strongly disagree 1 2 3 4 5 6 7 *Strongly agree*

11. Goofed around during rehabilitation.

Strongly disagree 1 2 3 4 5 6 7 *Strongly agree*

12. Overdid rehabilitation.

Strongly disagree 1 2 3 4 5 6 7 *Strongly agree*

INJURY STUDY PROCEDURES

WHITE FORM

STEP ONE

Subjects asked to participate in a study examining the psychological side of sports injury injury and rehabilitation. ***Consent for Research*** form given.

Place all completed forms in the yellow coloured folder, labelled *Confidential.*

ORANGE FORM

STEP TWO

Orange coloured ***Initial Injury Evaluation*** questionnaire to be given immediately after the Consent for Research form has been signed.

Place all completed forms in the yellow coloured folder, labelled *Confidential.*

BLUE FORM

STEP THREE

Blue coloured ***Weekly Injury Evaluation*** questionnaire to be given once a week while subject is receiving treatment.

Place all completed forms in the yellow coloured folder, labelled *Confidential.*

GREEN FORM

STEP FOUR

Green coloured ***Final Injury Evaluation*** questionnaire to be given at the final physiotherapy session.

Place all completed forms in the yellow coloured folder, labelled *Confidential.*

PINK FORM

STEP FIVE

Pink coloured ***Physiotherapist's Evaluation of Subject*** questionnaire to be completed by the physiotherapist after the final physiotherapy session.

Place all completed forms in the yellow coloured folder, labelled *Confidential.*

Points to Remember

1. All people with new ankle injuries or recurrence of old ankle injuries (make a note of the latter on the *Initial Injury Evaluation* form) are eligible for the study.

2. Record the grade of injury (i.e., Grade 1, 2 or 3) on the *Initial Injury Evaluation* form.

3. If the subject asks for more information about the experiment give no more details than those stated on the Consent Form. However, at the end of the experiment, the subject can receive a written outline of the outcome of the experiment if the subject wishes so.

4. Emphasise the benefits of the study at the Consent Form stage.

5. For consistency among all physiotherapists, the final physiotherapy session is defined as 90% recovered to that point in time from the physiotherapists' point of view.

6. If there are any problems, please don't hesitate to call me on Ph 282 2007 (I have an answering machine) and I'll endeavour to answer them as soon as possible.

7. Please make an informal note of any comments the subjects may make about the experiment or issues that arise during the experiment.